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MAGAZINE

Revolutionary or Evolutionary?

Microsoft Office, Sidekick, and More
First-Generation Win 95 Applications

The Bottom Line

PC Labs Tests Eight
LAN-Based Windows
Accounting Packages

Jim Seymour

Don't Scrimp on
Your Hard Disk:
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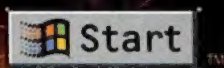
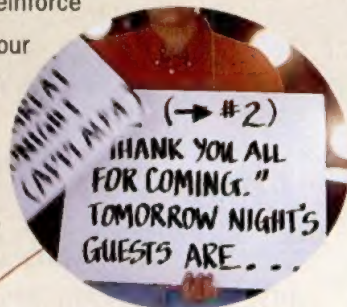


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Inside

Information everywhere is the catchphrase of the computer age, and on-line services and the Internet continue to be the most exciting parts of the computer world. Just look at how much interest there now is in using the Internet and setting up Internet

pages and sites, as evidenced in this issue's cover story.

PC Magazine has been a part of the on-line world for some time. We've offered different electronic companions to the print publication, ever since we started the Interactive Reader Service bulletin

Magazine on the Web (<http://www.pcmag.com>), as part of the overall ZD Net presence on the Web (<http://www.zdnet.com/~pcmag>).

Our Web presence continues to expand and now includes new columns from Don Willmott and John C. Dvorak as well as material from PC Labs.

We continue to add to the number of places you can find our content. We recently launched on AT&T Interchange, which provides a wealth of graphics and a publishing format beyond what we've seen on the other services. Our presence there, part of ZD Net/Interchange, initially includes software and highlights from the print publication, but we plan to expand with more interactive elements. For details, call 1-800-595-8555.

More recently, we've started to expand onto the Microsoft Network as well. While the service was being tested, we started an experimental chat and bulletin board service; now we'll be offering more content and more information.

Soon we'll be delivering even more information about on-line services from PC Magazine—in the pages of our printed version, on our PC Magazine CD, and, of course, in our on-line postings.

—Michael J. Miller



Executive editor Rick Ayre is our on-line expert and chief Web searcher.

board way back in 1985, with the primary goal of making it easier for readers to get our utilities. That service developed into PC MagNet and later into ZiffNet (now renamed ZD Net) on CompuServe (GO ZNT:Editorial).

Today, that service provides hundreds of thousands of readers with access not only to our software but also to vibrant discussion areas. In early 1994, we expanded onto the Internet, offering PC

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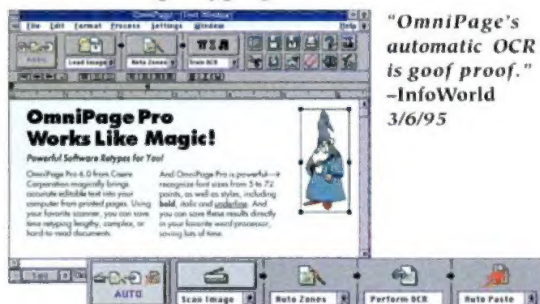
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CIRCLE 292 ON READER SERVICE CARD

UP FRONT

Inside

On-line with *PC Mag*4

Letters

Bungling the beta process.....19

Trends

- The Web divided
- NSP: Back to the drawing board
- The 651st megabyte
- Chilly chips.....29

First Looks



HP Pavilion 7050: A new look in PCs (page 46).

- Lotus Word Pro
- AT&T Interchange
- Panasonic PowerDrive?.....37

New & Improved

BY MELISSA PERENSON61

Read Only

EDITED BY TIN ALBANO.....69

COLUMNISTS

Michael J. Miller

Cybersex Shock75

Bill Machrone

The Perfect Desktop83

Second Looks85

John C. Dvorak

Win 95 vs. OS/2:

Some Thoughts.....89

Inside Track91

Jim Seymour

Don't Get Giggled.....93

Bill Howard

Dead-End Software95

COVER STORY

THE INTERNET: Make It Work for You

The Internet is much more than just a playground for entertainment. Now more than ever, it's a place to make things happen. New access tools and easier-to-manage Web servers are making the Internet more accessible, and you need to know how they work. In this special four-part story, we evaluate all the tools you need to take maximum advantage of every part of the Internet.....106



Get Connected

NEW PATHS TO THE NET

BY RICK AYRE

There's a war on for your data dial-tone dollar: On-line services are battling to provide the cheapest and easiest Internet access. They're competing not only against one another but also against nationwide and local ISPs—Internet service providers that can supply higher-speed service at even lower prices. Complicating the picture further is The Microsoft Network; we'll give you an idea of how it compares. In this story we gauge the Internet features of six on-line services—America Online, CompuServe, Delphi Internet, GENie, MSN, and Prodigy. We also review five ISPs and look at the recently launched AT&T Interchange Online Network.....109



The Best & Worst of	GENie Online Services132	Summary of Features.....134
On-Line Services.....110	The Microsoft Network.....136	Internet Service Providers140
Editors' Choice.....111	Prodigy.....136	AlterDial.....140
Highlights.....112	The Microsoft Network's	IBM Internet Connection
On-Line Services.....113	Big Debut.....116	Service.....140
America Online.....113	AT&T Interchange	internetMCI.....146
CompuServe Information	Opens for Business.....118	NetCom Internet Services.....147
Service.....118	An On-Line Update:	Pipeline USA and Interramp.....147
Delphi Internet.....119	Bigger, Faster, Easier.....120	Summary of Features.....142, 146

See the Sites

BEYOND
BROWSING

BY RICK AYRE AND DON WILLMOTT

Chances are you're already using a Web browser. But do you also have Internet e-mail, FTP file downloading, and a telnet client? We look at 14 integrated Internet suites that offer a good mix151



Products reviewed:	
<i>Acadia/VxD 2.0</i>153	<i>MultiNet for Windows 1.1</i>187
<i>Explore 2.0</i>161	<i>Netscape Navigator, Personal Edition</i>188
<i>IBM Internet Connection for Windows 3.0</i>164	<i>Quarterdeck InternetSuite for Windows 1.0</i>188
<i>OS/2 Warp Connect 3.0</i>169	<i>Softerm Plus + 4.0</i>197
<i>InterAp 3.1</i>170	<i>SuperTCP Suite 1.1</i>200
<i>Internet Anywhere 2.1</i>177	Editors' Choice.....153
<i>Internet Chameleon 4.5</i>178	Summary of Features.....168
<i>Internet Membership Kit 2.0</i>182	Internet Tools for Free.....165
<i>Internet Office 4.0</i>186	The Best of Everything.....184

Publish to the Web

NO EXPERIENCE
REQUIRED

BY EDWARD MENDELSON Learning HTML, the tagging language used to create Web home pages, is simple with the aid of an HTML editor. We review five and also look at some shareware editors. We also discuss the future of HTML and show you how we create the PC Magazine home page.....203

Products reviewed:	How PC Magazine Creates
<i>HotMetaL PRO 2.0</i>205	Web Pages.....206
<i>InContext Spider 1.0</i>207	HTML's First Lesson: Shareware and Other Useful Tools.....210
<i>Internet Assistant for Microsoft Word for Windows</i>211	Under Construction: NaviSoft's NaviPress.....211
<i>WebAuthor</i>218	HTML Trends: What's Next on the Web?.....214
<i>WordPerfect Internet Publisher for Windows</i>218	WebPublisher: The HTML Converter That Works.....216
Suitability to Task.....204	
Editors' Choice.....205	

Set Up Shop

A SITE OF YOUR OWN

BY KEVIN REICHARD Web servers are popping up for just about every platform—and turnkey, hardware/software solutions are dropping in price as they grow in power. We review seven Windows NT–based server software packages and four turnkey systems (three Unix-based, one Intel). We also survey server products on other platforms, including Apple Macintosh and Windows 3.11227

Windows NT–Based Servers:	Why We Couldn't Test
What's the Rush?229	Server Performance.....242
<i>Communications Builder</i>233	Summary of Features.....249
<i>Commerce Builder</i>233	Turnkey Solutions:
<i>HTTP Server for Windows NT 0.96</i>239	One-Stop Shopping253
<i>Netscape Communications Server 1.1 and Netscape Commerce Server 1.1</i>242	<i>Web Server 10</i>256
<i>Purveyor 1.0</i>243	<i>Internet AlphaServer 1000</i>266
<i>WebSite 1.0</i>249	<i>Netra Internet Server</i>269
Editors' Choice.....232	<i>WebForce INDY</i>270
Specialty Web Publishing Tools.....236	Editors' Choice.....256
Too New to Review.....238	Windows 3.1x Servers: A Web Site on Every Desk260
	Summary of Features.....265
	The Apple Internet Server Solution268

FEATURE

Multiuser Accounting

THE BOTTOM LINE ON
WINDOWS

BY TED STEVENSON AND THOMAS WHITE Flexible interfaces and better integration with other applications are now the order of the day. We review eight contenders that bring Windows-based accounting modules to market and look at two others that are on the way273



Products reviewed:	
<i>Accounting Vision/32</i>278	<i>Solomon IV for Windows</i>302
<i>Dynamics LAN 2.1</i>280	<i>Traverse Accounting Business Software for Windows</i>303
<i>Impact Encore 1.0</i>283	Editors' Choice.....274
<i>Progression Series 7.0, WindowsPlus Solutions</i>288	Performance Tests.....285
<i>Pro Series 3.01i</i>294	Late Out of the Gate.....290
<i>Scala for Windows 3.1.5</i>300	Summary of Features.....295
	Report-Writer Report.....300

PC TECH

C++: Windows 95 Update

BY MATT PIETREK

With the arrival of Windows 95, the transition to 32-bit code is on—and the major C++ development tool vendors are ready.....305



Tutor



BY JEFF PROSISE

Can the Windows 95 VFAT handle large hard disks?345

Inside Windows 95

BY STEVE RIGNEY AND BARRY SIMON

Customizing the Windows shell355
Long filenames in networked environments that mix 16-bit and 32-bit apps...369
What the first mobile-aware operating system offers to traveling users.....375

Power Programming



BY JEFF PROSISE

Two ways to bit-block-transfer non-rectangular images while leaving background colors unchanged393

Special Report

BY CADE METZ

The Complete Windows 95 Annotated File Listing423

Inside OS/2

BY GABRIELLE GAGNON

IBM's System Object Model: Object-oriented technology that offers advantages to end users and programmers alike513

Utilities



BY DOUGLAS BOLING

LaunchCtrl lets you specify how and where Windows runs both DOS and Windows programs523



Boldly go where no game has taken you before with Star Trek: The Next Generation "A Final Unity" (page 634).

PC SOLUTIONS

User-to-User



BY NEIL J. RUBENKING

Customizing your Windows 95 shut-down screen; batch files that determine whether two PATH variables are the same; using environment variables in Windows545

Hardware

A monitor that wobbles after switching from Windows to DOS; how to get better sound quality on your voice mail system.....548

Operating Environments



When copying a large group of files gets slower and sllloowwww; getting a DEBUG script that turns off NumLock right; formatting and printing Windows Help files552

Word Processing

Should you use Word for Windows' Master Document feature to edit huge, complex WinWord files?556

Spreadsheets

Macros that highlight locked cells the way Lotus 1-2-3 used to do562

Databases



Adding sound to your Microsoft Access applications562

Graphics

Converting PageMaker documents for use in QuarkXPress574

AFTER HOURS

You're Never Too Old To Learn

- Educational Software for Adults
- CD-ROM Pick Hit: The Beer Hunter
- Music: MusicStar
- Strategy: Jagged Alliance
- Spotlight on "Star Trek": Star Trek: The Next Generation "A Final Unity"
- Quick Clips631

Abort, Retry, Fail?

BY DON WILLMOTT644



The effect of gamma rays on fish in a bowl (page 644).

ALSO IN THIS ISSUE

PC Direct	545
Marketplace.....	602
Premier.....	602
Classified.....	616
BusinessCard	628
Reader Service Card.....	609
Advertisers' Index: Companies.....	637
Advertisers' Index: Products	639
Coming Up	642
Editorial Product Index.....	643

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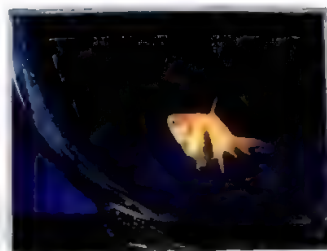
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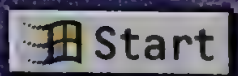
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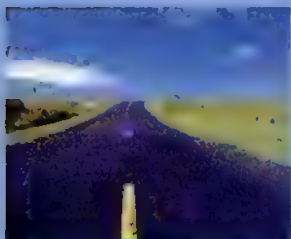


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CIRCLE 316 ON READER SERVICE CARD

Letters

BETA TESTERS ANONYMOUS

Three cheers for Robin Raskin's piece "This Column Is in Beta" (May 30, 1995). It's about time someone put in writing what needed to be said about betas and upgrades. I finally feel it's not my fault that software doesn't do what it's supposed to do. I think that software companies should take a hard look at the publicity they generate prior to releasing a program that's not really ready for prime time or before announcing an upgrade that isn't even halfway through the beta process.

MICHAEL N. HAMPEN, *via the Internet*

I just finished reading Robin Raskin's column, and I have to wonder if she was reading my mind. I gave up a long time ago on working with frustrating beta releases; now the industry seems bent on selling us incomplete and unstable programs. This is akin to going to a car dealership and having a salesman try to sell you a sports car without an engine. Great body, looks nice, but it won't run as advertised.

BRETT RYAN, *via the Internet*

The late Windows 95 beta works on my machine, but that's because the bugs I reported were addressed and because I continue to receive updated builds to test. Every week, more and more problems are solved, and more and more beta testers moan and groan of boredom because we "insect detectives" are running out of bugs to find.

MICHAEL D. RATH, *via PC MagNet*

THE BASIC APPEAL OF BOB

Although I haven't used Bob myself, from what I've heard about it, John C. Dvorak's column "Is Bob Really a Kidsworld?" (June 13, 1995) is right on target. His statement about its "elaborate password protection" made me pause, however. According to Microsoft, if you enter an incorrect password too many times, Bob assumes you have forgotten your password and asks if you want to assign a new one. I think this only further bolsters Dvorak's position that Bob is a toy, not a program for serious adult users.

THOMAS E. BRIDGMAN, *via the Internet*

On my first browse through Bob, I certainly found it an inefficient way to start a program. But then I introduced Bob to my wife, and since then I've barely been able to access the computer at home. She enjoys the program's simplicity and the ability to decorate and redecorate her rooms. Bob may not be attractive to skilled users, but if my wife's response is any indication, it certainly is a wonderful way to introduce new PC users to computing. The only downside has been the confusion it has caused our friends when my wife tells



Now the industry seems bent on selling incomplete and unstable programs.

them she's been spending most of her time with Bob. My name is Dan.

DAN ASTURIAS, *Merced, California*

I thought the same thing as Dvorak when I first installed Bob. But when I showed Bob to the folks in Human Resources, they loved it, as did our librarian. And when I showed it to my four-year-old daughter, she loved it; her new imaginary best friend is her guide, Shelly. Perhaps Bob is not meant for the power-user readers of *PC Magazine* but is intended instead for the staff, the librarians, and the daughters of the world who think smiley-faced computers are cute.

LEE THOMAS, *via the Internet*

IS THE FUTURE REALLY HERE TODAY?

Reading the Trends section in the issue of May 30, 1995, made me feel as if I were living in the age of the great discoveries. When I finished reading the piece "High-Protein Computers," my first reaction was, "No way, it's too farfetched, and that can never happen." But then I recalled there was once a time when people refused to accept the notion that the Earth was not flat, and a time not so long ago when people who read Jules Verne's books were amused by those unbelievable stories of space flight.

YORAM ADLER, *Brooklyn, New York*

A few years back, I read a book about the future, in which Nostradamus predicted that computers of the future will be biological. We should always keep an open mind about where technology is headed.

DON DURRETT, *Buena Park, California*

IT'S TIME TO LEARN YOUR HTML ABCs

Thank you for the clearly written article explaining the basics of HTML (PC Tech, "An HTML Primer," June 13, 1995). As always, the articles in the PC Tech section are a treasure trove of tips and guides to help users navigate the ever-changing environment of personal computing. And the HTML tutor is an excellent example of timely information that will help those of us who have found ourselves suddenly zooming along the Internet's fast lane.

JOE THOMAS, *Tempe, Arizona*

MULTIFUNCTION FUNCTIONALITY

I couldn't agree more with your choice of the Brother Multi-Function Center 4500 ML as your Editors' Choice for multifunction printers ("Swiss Army Printers," June 13, 1995). The uses I've seen for this machine are simply incredible. But I feel you left out one very important feature of this machine. The memory isn't shared between the fax machine and laser printer; rather, there are separate memory blocks for both the printer and fax. This is particularly useful when you're in the middle of a big printing job and there's an incoming fax transmission.

DEAN A. LADDIE, *Margate, Florida*

How can you consider a hydra printer for making excellent copies? None of the hydras will work as well as the cheapest dedicated personal copier around. Hydras represent a Rube Goldberg approach to making copies.

ALEXANDER ROMM RYSMAN,
Brockton, Massachusetts

TELEPHONY TODAY

The article "At the Sound of the Beep..." (June 13, 1995) was on the whole a well-documented and compelling look at the advancements in PC-based telephony available to the SOHO market today. But as a third-party provider of voice mail, paging, and live answering services, I feel your summary of services from sources beyond Regional Bell Operating Companies was incomplete. Independent operator-answering services can serve up a variety of customized services for the mainstream small and medium-size businesses, and they do so with a friendly neighborhood smile.

ANGUS CAMPBELL,
New York, New York

THE ELUSIVE SWEET SPOT

Bill Howard thinks he's "Hitting the PC Sweet Spot" (May 30, 1995)? I wonder how Howard arrived at his 16MB of RAM, 1GB hard disk, and quad-speed CD-ROM drive "sweet spot." At the rate software developers



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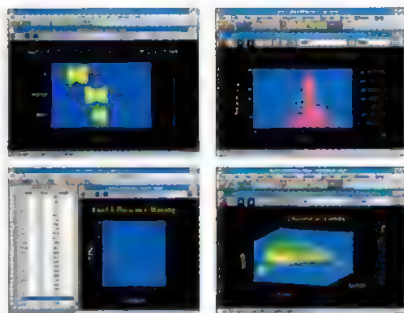
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Letters

consume resources, the sweet spot is as elusive as the proverbial gold pot at the end of the rainbow.

MICHAEL A. THOMAS, *via the Internet*

CYBERSPACE LIFESTYLES

As an occasional user of several different MUSHes, I turned to Bill Machrone's column ("MUDs and MUSHes and MOOs," May 30, 1995) first. Although MUDs and other virtual worlds were not the focus of the column, I must say that Machrone has provided only a sketchy picture of the possibilities of what such virtual worlds can really do. Sure, not everything about MUDs are good, but lots of things are. As with the arguments against legislation in cyberspace, people should be allowed to make their own personal judgments.

JENNIFER SARANTITES, *via PC MagNet*

IT'S ABOUT TIME

Thanks to John C. Dvorak for finally bringing Senate Bill S-314 to the attention of *PC Magazine's* readers (Inside Track, May 30, 1995). Computer users need to keep the lawmakers' hands off the Internet.

ADAM MCKENNA, *via the Internet*

REMOTE CONNECTIONS

While we thank you for including our LapLink for Windows in your article "The Art of Being Remote" (August 1995), we feel that the benchmark tests and rating parameters failed to reflect the top two usability criteria required by customers using remote control: reliability and ease of use. Feedback from our customers shows that speed, which appeared to be the yardstick

HOW TO CONTACT US

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CORRECTIONS AND AMPLIFICATIONS

In our roundup of remote-control software ("The Art of Being Remote," August 1995), the correct 800 number for Traveling Software's LapLink for Windows is 800-343-8080.

The correct phone number for Caliper Corp.'s Maptitude (First Looks, "Mapitude: Mapping Software with Low Hurdles," September 12, 1995) is 617-527-4700.

for this roundup, is a concern after these two requirements. We'd also like to point out that the measurement of file-transfer speed apparently failed to reflect innovations like our patented SpeedSync technology, which transfers only the changes in a file in order to reduce transfer time significantly.

MARK EPPLEY, CHAIRMAN AND CEO,
TRAVELING SOFTWARE,
Bothell, Washington

NEW DIRECTIONS FOR PENTIUM PCs

Your review of Pentium machines ("Tapping the Promise of the Pentium," May 30, 1995) was very useful, and the performance comparison among the reviewed machines was informative. But many of the companies whose machines were reviewed offer other operating systems besides DOS and Windows 3.1, and such information would be extremely useful if included with your reviews.

J. KEITH WEDINGER,
Lexington, Kentucky

I have to wonder why you focus on single-tasking Windows benchmark tests, especially as it pertains to things like hard disk performance. This is like *Motor Trend* quoting only a car's 0- to 60-mph time when evaluating its engine and ignoring the engine's fuel economy and reliability, and the ease of service. I hope your next generation of tests will better address the concerns of advanced users.

ERIC ROSENQUIST, *via PC MagNet*

Thanks for the great article on Pentium computers. Our company is currently planning the purchase of several computers, and your article was informative and very thorough, and went a long way toward helping us make solid purchasing decisions.

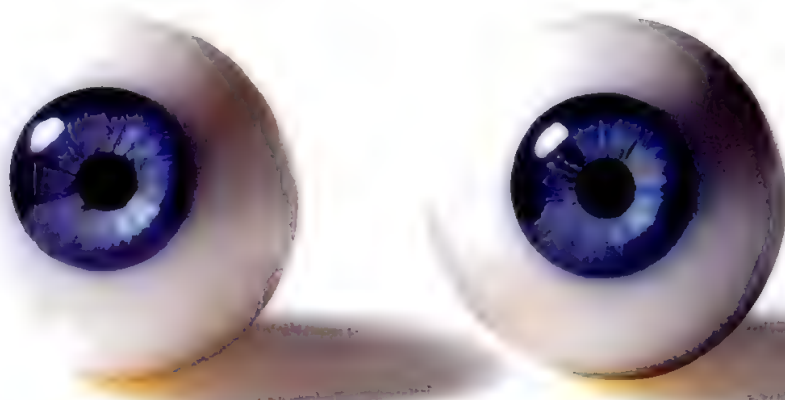
CRAIG BONVECHIO, Naples, Florida

INSIDE TRACK

John C. Dvorak applauds the fact that most of the next-generation, high-end PC games will not even work on a 486 PC (Inside Track, June 27, 1995). Do game developers have any idea how many 486 systems are in use? If game developers lock out an entire segment of the market, they're only doing a disservice to themselves, since we as consumers won't be buying their product.

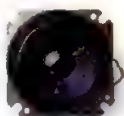
CASSANDRA STEELE, *via PC MagNet*

SHOPPING FOR A 17" MONITOR? ENJOY THESE FABULOUS SAVINGS.



"If you stare into only one 17-inch screen this year, let it be Nokia's..." said the editors of *Home Office Computing*. Excellent advice, if you want to rub your eyes in astonishment — not irritation.

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At 3.9 pounds, the Meridian 400 is molded with a special carbon-fiber material that cuts weight and improves durability. And with a DX4-100MHz processor *standard*, it may well be the highest performance subnotebook available; "faster than a speeding desktop" is how *Computer Shopper* described it.

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At 6.3 pounds, the Meridian 800 full-size notebook is light enough to travel anywhere yet, with its whopping 10.3" dual scan or 9.5" active matrix color display, is large enough to use for presentations and everyday computing.

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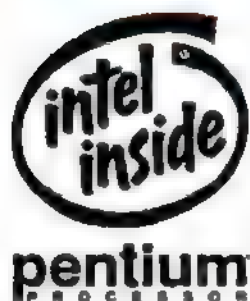
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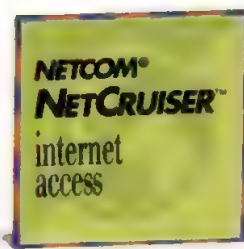
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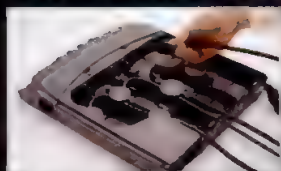
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Trends

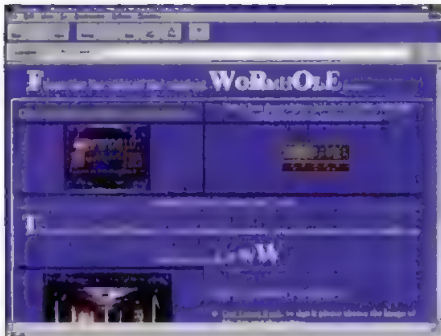
TRENDS & TECHNOLOGY SHAPING THE PERSONAL COMPUTER MARKET

The Web Divided

The long road to stable authoring tools.

At this point in the evolution of the World-Wide Web, the specter of the great oxymoron “competing standards” has begun to rear its ugly head, and the confusion posed by proprietary extensions to Web browsers might soon become real.

Web pages are nothing more than text documents with formatting codes created with the HyperText Markup Language, better known as HTML. Since all Web-browser software is designed to display HTML documents, any browser can access any Web page in the world. Beyond the basic codes or “tags” for text and titles, HTML has tags for graphics, image maps, fill-in forms, and document backgrounds. There are also design codes for text alignment, graphics placement, and table creation. Working with the full suite of HTML tools, you can present some sophisticated designs to the world.



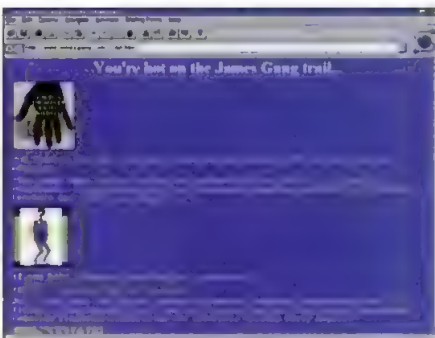
Netscape Navigator (left) has all the formatting extras, while NCSA Mosaic offers standard fare.

And if you use Netscape Navigator, you've already seen most of these features in action.

But there's a problem brewing: Proprietary extensions to HTML may undermine the purpose of a standard format for Web documents. In fact, the Internet Engineering Task Force, the principal stan-

dards committee, hasn't officially adopted the features proposed for HTML 3.0. (The proposals for HTML 2.0 are just now being implemented as standards.) Meanwhile, HTML 3.0 features, including tables, graphics alignment, banners, text wrap, and many other design tags, are already popular in some browsers. (See “Beyond Browsing” for evaluations of Internet software.)

Netscape Navigator has always handled HTML 3.0 as well as Netscape-only codes such as variable font sizes within paragraphs, line and word breaks, and customizable bullets and numbers in lists. Now other



browsers are playing catch-up and leaving the official standards behind as well. This trend toward nonstandard HTML may mean that only Netscape users will have access to advanced HTML pages. This is already the case with some of the more exotic pages on the Web. Some pages, for instance, work only with Sun's HotJava



advanced browser technology. Netscape plans to support HotJava in the near future.

Jeff Treuhaft, a product manager with Netscape Communications, does not think there's a problem, because Netscape is working with the IETF to implement HTML standards. “The Net was born out of a model where standards didn't exist,” he says. “There was no way to draft these standards without implementing them first.” One of Netscape's roles, Treuhaft says, is to use its significant share in the browser market to let the industry know what users really want. At recent meetings of the IETF, he says, discussion has revolved around which HTML extensions are most useful and how to implement them without a full standard for HTML 3.0.

Some HTML developers find the trend toward Netscape extensions undesirable as they put aside other priorities to achieve Netscape compatibility. “This is not good news for cross-platform communications or for the future of the Web,” says Web developer Tony Grant of Pakeha New Media Consultants in Nantes, France, who is now building browser-specific pages. “This is starting to look worse than compatibility between word processor files.”

Yet other developers see Netscape as doing only what the Internet community has done for a long time. Says Terry Kuny of Global Village Research in Ottawa, “Netscape has put forward an open system and allowed the community to decide what it wants to use.”—Neil Randall

Pipeline By Jake Kirchner

Windows 95 Launch: The Day After

Now that the smoke has cleared from the Windows 95 launch, the Microsoft team members must feel like they've survived a military campaign. After three years of development work and the largest beta program in the history of PC software, Windows 95 finally shipped, and the team went off for a long spell of R and R.

We have a small hint of how they must feel, because even here at *PC Magazine*, participating in the beta program was grueling. One of our review team managers has the prerelease CDs in rows along his office wall like several dozen military service ribbons. Squads of staffers spent thousands of hours loading, running, and reviewing each build.



Week after week the new builds hit our desks, sometimes at a rate of two a day. Along the way we lost count from the first official beta release in May 1994 to the final CD of gold code in mid-July 1995.

With all our activity, we were just fighting a small skirmish in a much larger battle. The number of participants in the Windows 95 beta was four times the size of the Windows 3.1 beta program. In all, some 50,000 sites around the world served in the official beta program. A million additional users at some 400,000 sites used beta copies as part of the Windows 95 Preview program. Bug reports flew like bullets, as the development team scurried to shore up all flanks.

To paraphrase the Gulf War catchphrase, it was the mother of all betas.

It didn't help that the beta period ran seven or eight months longer than predicted. But what really escalated the process was the degree of technological advance in Windows 95 over earlier versions. Brent Ethington, a Windows product manager at Microsoft, also notes there are many more hardware platforms and software programs demanding compatibility than ever before. More importantly, there are 70 million or more Windows users out there—all of them potential upgraders to Windows 95. A less-than-solid product would have been disastrous to Microsoft's short-term financial health and long-term corporate goals.

Did it work? Ethington says yes. The long beta was "invaluable as far as shipping a quality product," he says. Here at the magazine, we found that Windows 95 has some flaws but is in good enough shape to upgrade right away, despite the industry's general aversion to 1.0 releases.

Of course, this very public beta was much more than a technical-development project. It was a concerted PR campaign that kept the industry's interest at a fever pitch. The widespread preview program allowed tens of thousands of corporate buyers to become familiar with the new operating system and—Microsoft hopes—comfortable with the upgrade prospect. From that standpoint, the beta was an unparalleled success.

Will we see a beta program this large again? Probably not, because it's unlikely that the same set of circumstances will arise—a major advance for a key operating system used by tens of millions. Of course, there's still Cairo, the next generation of Windows NT, which may emerge as the successor to both Windows NT and Windows 95.

But that's several years away. For now, at least, it appears we've seen the beta to end all betas. For all of us, it's time to declare victory and go home.

Jake Kirchner is the editor of PC Magazine.

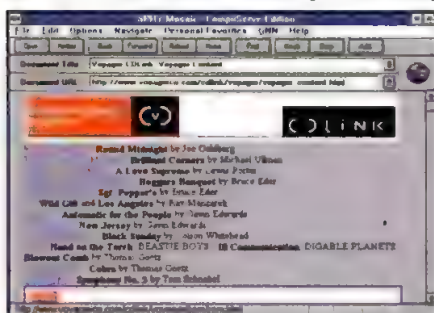
The 651st Megabyte

CAN'T CRAM ANY MORE DATA onto that CD-ROM? Linking on-line content with CD-ROMs may be the answer for prolific publishers.

Both commercial on-line services and the Internet have positioned on-line content as extensions of CD-ROM titles. At the World-Wide Web page for the CD-ROM—title producer Voyager (<http://www.voyagerco.com>), visitors can download CD-Link software, which links content on the Web with audio CDs. Via CD-Link, lyrics, graphics, and video clips at Web sites can feature links to music on a CD. For example, you can click on an on-line graphic of Miles Davis and hear linked music from a Miles Davis CD that you already own.

"The page links to a text file of .VCD file format, which a Web browser passes to our CD-Link software, which then plays the linked audio clip from the CD," explains

Trevor Kaufman, Voyager's on-line director. Voyager is currently in the process of licensing the CD-Link software to companies in the music industry, including



Voyager's CD-Link connects music CDs with the Web.

Rykodisk and EMC. The strategy is potentially more far-reaching than Philips' CD Plus, a new standard based on the Multi-session Compact Disc format (supported by Apple and Windows 95, among others) for adding video, lyrics, and other extras to music CDs.

By fall, a flood of multimedia titles fea-

turing links to on-line extensions will appear. Among several titles due from Microsoft, a new version of the Encarta encyclopedia will link to more current information than a CD-ROM alone can contain. A current-events link, for instance, will link CD-based information on the O.J. Simpson trial to up-to-the-minute documents from outside experts. Microsoft is expanding the editorial team behind Encarta dramatically to develop the new on-line content.

Magazines, too, are affected by the trend toward hybrid CD/on-line packages. Ziff-Davis (the publisher of *PC Magazine*) has launched *ZD Internet Life*, a quarterly publication that merges three media: print, CD-ROM, and on-line. And Multicom Publishing, which publishes home CD titles in association with *Better Homes and Gardens*, is adding on-line links to its CD offerings. Kelly Conway, vice president of Multicom, warns that many current on-line extensions to CDs are clumsy and limited. "There's a bright future for this, though," Conway says.—*Sebastian Rupley*

NSP: Back to the Drawing Board?

IN A MOVE THAT PROMISES TO affect multimedia hardware developers across the board and slow development of some of this year's multimedia systems and peripherals, Intel has decided to alter its NSP (native signal processing) reference platform significantly. The move comes after recent reports of NSP-related feuds with Microsoft and lukewarm support for NSP from some multimedia developers.

"Intel was in no position to set a broad-based standard like NSP," says a source at a leading system maker. The source is currently working on a P6 system that incorporates a dedicated sound subsystem, rather than using NSP-based sound on the host Intel CPU.

The original NSP reference platform was designed not only to off-load multimedia functions from dedicated subsystems to the host CPU, such as a Pentium chip, but to put Intel in control of key software services and application programming interfaces (APIs). These software components could have meant compatibility advantages for Intel



CPUs over competitive CPUs, such as AMD's and Cyrix's. The original NSP reference platform called for a real-time kernel, IA-SPOX, to load before Microsoft's Windows 95, providing many of the functions that Windows 95's Direct X APIs (hooks to technologies such as Direct Video and Direct Draw) would otherwise have provided.

While Intel and Microsoft won't yet acknowledge any official agreement, developers say that a new, joint multimedia reference platform that de-emphasizes the original NSP

software services is imminent. The repositioning will likely mean that NSP is as compatible with CPUs from competitors as it is with Intel's and that Windows 95 will not be preempted in providing key multimedia services.

"I can definitely confirm that Microsoft and Intel have been fighting over NSP," says Jeffrey Flink, director of marketing at Award Software,

which is proceeding with its NSP-compliant BIOS and system software. According to Flink, in spite of disagreement between Intel and Microsoft over how far NSP goes, Intel "can still raise the minimum standard for host CPU-based multimedia in systems."

For now, though, the NSP initiative appears stalled.—*Sebastian Rupley*

Top Retail Software		
Current ranking	Last issue	Product, company
1	—	Microsoft Plus! for Windows 95 Microsoft Corp.
2	—	The Norton Utilities for Windows 95 Symantec Corp.
3	—	Microsoft Windows 95 Upgrade Microsoft Corp.
4	—	Norton AntiVirus for Windows 95 Upgrade Symantec Corp.
5	—	Norton AntiVirus for Windows 95 Symantec Corp.
6	—	Norton Navigator for Windows 95 Symantec Corp.
7	—	Microsoft Windows 95 Microsoft Corp.
8	—	Microsoft Word 7.0 for Windows 95 Upgrade Microsoft Corp.
9	—	Microsoft Excel 7.0 for Windows 95 Upgrade Microsoft Corp.
10	—	Norton Navigator for Windows 95 Symantec Corp.

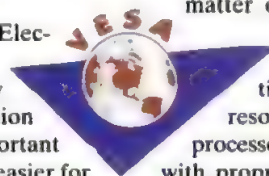
This list ranks PC business programs according to the total number of copies they shipped to over 12,000 stores and resellers in the week ending August 25, 1995. The list cannot be interpreted as a picture of the entire software market. Adapted from a compilation by Ingram Micro.

Notebook Manufacturing Simplified

NOTEBOOK MAKERS MAY SOON find it easier and less expensive to design new flat-panel displays into notebooks with the help of a new standard that aims to halt the proliferation of incompatible LCD panel interfaces.

The LCD panel market is now tangled in a mess of proprietary requirements. An engineer designing a new notebook PC must choose a panel and design around it. Different panels have different form factors, interface requirements, signal timings, and other details. Even within a single LCD manufacturer's product line, design requirements can vary significantly.

Developed by the Video Electronics Standards Association (VESA), the Flat Panel Display Interface (FPDI) specification could have a number of important results. First, it would make it easier for manufacturers to design notebook displays. It would also allow a manufacturer to use multiple sources for displays, instead of being locked into a single-source proprietary design. This means that smaller flat-panel manufacturers could provide a portion of the manufacturer's part requirements, which in turn could increase competition.



The standard may also bring exotic new flat-panel display technology to the market. If computer manufacturers don't have to design special models to make use of these new panels, but instead can simply plug the panels into existing designs using a standard interface, they may be more likely to take a chance by using a new-technology panel for a short run.

VESA already has a proven track record for tackling such Herculean tasks. Back when every graphics card and monitor manufacturer had a different idea of how to implement 800-by-600 resolution, it was a matter of luck if you could get two devices to work together—until VESA set standards for timing signals for Super VGA resolutions. And when 32-bit processors begat Towers of Babel built with proprietary 32-bit expansion slots, limiting expansion cards to whatever the individual manufacturer would provide, VESA weighed in with the VL-Bus.

At first, the standard will cover connector interface design, signal names and timing, and power sequencing. Next year, VESA hopes to extend the range of panels covered by the specification and improve interchangeability.—*Alfred Poor*

Solving the R & D Crisis

JUST FLIP THROUGH THE PAGES OF this magazine, and you'll see no shortage of new and innovative products. Yet some industry watchers see the warning signs of a slowdown. By focusing on product development—and the immediate gratification of marketable products—instead of encouraging more investment in basic research, technology industries are putting their leadership in jeopardy.

At least that's the conclusion of a study recently conducted by the Institute for the Future, a Menlo Park, California-based think tank. The study focused on eight research-intensive industries, including computers, software, and semiconductors, as well as aerospace, chemicals, pharmaceuticals, communications equipment, and scientific instruments. The bottom line: The growth in business spending on research and development is not fast enough to offset the decline in government support.

The study points to several factors contributing to the decline in the rate of R & D investment by American businesses. Among them: Companies' returns from R & D are diminishing as global competition and commoditization squeeze prices; the costs of research and development are climbing (a chip plant costs over \$1 billion to build today); and shrinking product life cycles have shifted the focus away from long-term research in favor of developing products with incremental improvements. Companies are also finding little incentive to invest in R & D, because the payback comes over the long term and is often uncertain. After all, R & D by its very nature explores scientific frontiers and often fails.

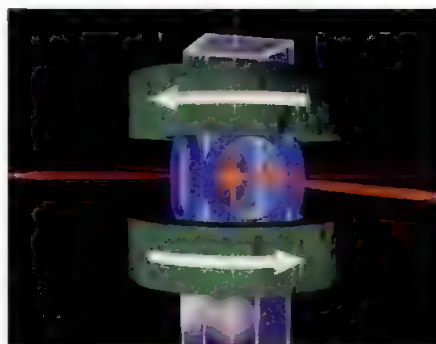
And while it's increasingly difficult today for a single company to fund large R & D projects, there's more pressure to deliver low-cost products quickly. The Institute reports, "The basic research done in central corporate labs—research that often sparked innovative leaps to whole new products and markets—is being replaced by more applied research...that produces mostly incremental changes in existing products."

Not all is doom and gloom, though. The Institute is optimistic that, with the help of some strong medicine, technology industries can reverse the trend and increase R & D spending from 2.6 percent (\$160 billion) of gross domestic product (GDP) to 3 percent of GDP. To stimulate investment, the Institute does not call for increased gov-

ernment spending, but rather for public policy initiatives. These include increasing tax incentives through a substantial R & D tax credit and lowering the capital-gains tax rate; expanding intellectual-property rights so inventors can protect their ideas in digital form; making encryption technology more attractive in the global marketplace; and adapting antitrust laws to encourage collaborative and international R & D ventures.—Carol Levin

Chilly Chips

MAKING A SCIENTIFIC DISCOVERY is one thing; turning it into a successful product is quite another. The recent discovery of a much-sought-after phenomenon known as the Bose-Einstein condensate



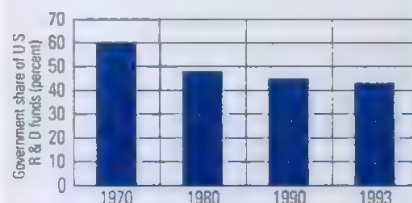
A laser trap was used to cool a cloud of rubidium atoms to form the Bose-Einstein condensate.

tion—a state of matter that is not exactly solid, gas, or liquid—is no exception. Yet the long-term significance of the finding could shed some light on future chip-manufacturing techniques.

In July, physicists Carl Wieman and Eric Cornell of the Joint Institute for Laboratory Astrophysics at the University of Colorado in Boulder observed the condensate, a material whose existence had been predicted by Albert Einstein and Indian physicist Satyendra Nath Bose, but never observed. On June 5, the condensate, a tiny speck of rubidium atoms cooled to absolute zero (−459.67 degrees Fahrenheit), revealed itself under a microscope for only a few microseconds. In fact, the heat from the microscope's light

The Great Slowdown

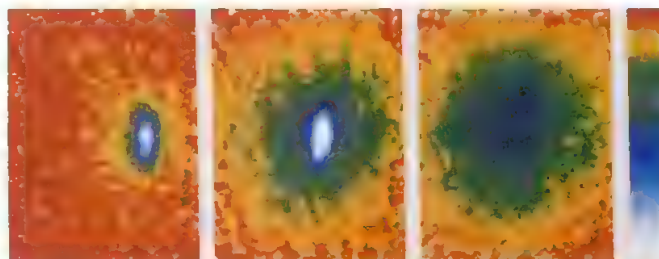
While the U.S. is at the forefront of R & D spending and business investment in R & D continues to grow, the growth is not enough to offset the decline in government support.



destroyed it instantly.

"It's very touchy stuff," says Wieman, a professor of physics at the University of Colorado, who is quick to point out that no one will be building computers with it any time soon. How the discovery could play a role in future chips is, at this point, mostly speculation. As devices on chips get smaller, more precise control of both the positioning and the energy of the atoms is needed. Creating the condensate is the closest anyone has come to this level of control. (In the same way that a laser concentrates photons, the condensate concentrates atoms.)

The first step, though, is to understand better the properties of the condensate itself. Then there's the challenge of repeating the experiment with atoms used to make computer chips. In the foreseeable future, the discovery may serve as an important laboratory tool for exploring basic physics and understanding how the laws of quantum mechanics apply to small collections of atoms. This field, known as mesoscopic physics, is becoming important at the leading edge of research that goes beyond the traditional model of resistors and capacitors,



Understanding the nature of the condensate is valuable in exploring how the laws of quantum mechanics apply to small collections of atoms.

explains Wieman.

Wieman draws a parallel to the demonstration of the first laser. "At the time, it was probably just a neat parlor trick," he says. "These things in basic science, you really have to give them quite a few years." —Carol Levin

Want access to applications and data on your network

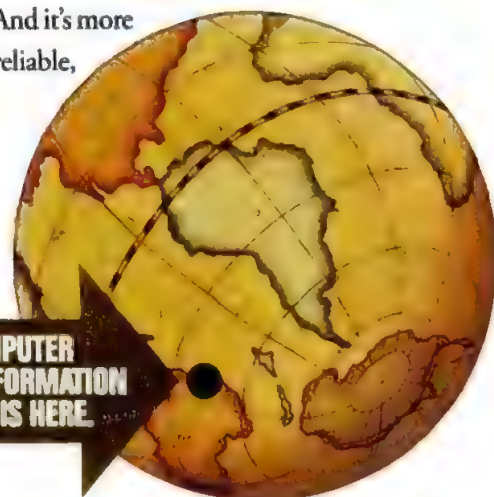


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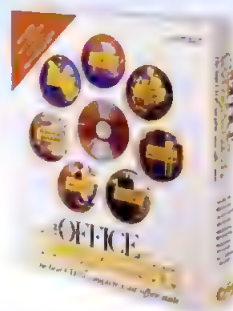
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First Looks

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SPECIAL REPORT: WINDOWS 95 APPLICATIONS

First Windows 95 Applications: Worth the Wait?

By Sebastian Rupley

Major new PC operating systems have always extended the horizon for desktop computing, but new applications are the lenses that bring these new capabilities more clearly into focus. As Microsoft Windows 95 ramps up, expect a flood of new 32-bit applications, featuring previously out-of-reach performance and capabilities, but don't expect any radical breaks with the past.

We've put the first crop of these applications—Microsoft Office for Windows 95, Microsoft Works 4.0 for Windows 95, Milestones, Etc. 4.5, The Microsoft Network, and Sidekick 95—through their paces, and found them to be a mix of old and new. Although each takes full advantage of Windows 95, these first applications as a group add only a handful of new features and capabilities over Microsoft Windows 3.1 applications.

First and foremost, these are all 32-bit programs, heralding the beginning of what will likely be a slow-but-sure end to the commer-

IN FIRST LOOKS

Lotus Word Pro 96 Edition for Windows 3.1	44
HP Pavilion 7050	48
AT&T Interchange Online Network	48
OmniPage Pro 6.0	50
Mathcad 6.0	51
TypeReader Professional 3.0XA	50
The World Book Multimedia Encyclopedia 3.1	49
ZAP-it	49
Medalist 1080	54
MGA Millennium	54
LF-1000AB Power-Drive?	56

cial development of 16-bit applications. Windows 95 is a preemptive multitasking operating system with sophisticated built-in memory management, and it runs 32-bit applications faster, more efficiently, and more reliably than it does 16-bit applications. Each of



ONE-CLICK ACCESS: The Microsoft Network is one mouse-click away from most Microsoft Windows 95 applications.

the reviewed applications now has a built-in uninstaller and also supports long filenames and basic OLE 2.0 functionality.

Microsoft has pushed several other features that show up in some of these applications, including context-sensitive menus available via the right-mouse button, Shortcut bars with multiple configurable tools and menus, and multithreading. Windows 95 applications, to one degree or another, take advantage of new applets and extensions in the operating system. For example, Sidekick 95 links to Microsoft's Fax applet so that you can easily send a fax to anyone in your contact database.

But by far the most interesting Windows 95 extension is the easy route mapped to Microsoft's online service, The Microsoft Network (MSN). One-touch access to both MSN and, later, to the Internet, is targeted to extend sever-



THE CLIP THAT BINDS: Microsoft Office for Windows 95's Binder can combine many different documents into a single file.

al key aspects of Windows 95 applications, especially when it comes to Help. For example, clicking to access MSN from Microsoft Excel 95 within the Office 95 suite will take you directly to the Excel 95 forum on MSN.

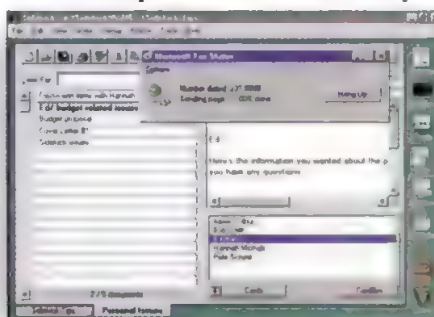
Office 95 implements all of the interface conventions mentioned above and a few new ones. For example, its Binder is a unique compound document container. Windows 95 features a document-centric interface style, whereas Windows 3.1 featured an application-centric interface style. Some examples of Windows 95's document-centric interface style include preemptive multitasking, multithreading, and OLE.

Windows 95 and its applications represent a significant closing of the gap between the PC desktop and the Macintosh and OS/2 desktops. With far more

responsible for the bulk of the first wave of Windows 95 programs. When can you expect to see other major Windows 95 applications? They'll trickle in throughout the rest of the year, with some showing up early next year. In terms of competing suites, Lotus says it will ship most of its applications in the November to January time frame; Novell is targeting early 1996 for native Windows 95 applications. Many major apps can be expected in the early fall, including Autodesk's AutoCAD, Corel's Draw, Delrina's Com Suite, Inset's Hijaak, Micrografx's ABC Graphics Suite, and a horde of utilities.

Do these first Windows 95 applications signal a renaissance for PC applications? Yes and no. While each application extends usability and power into new territory, each is largely an extension of technology you've seen in the past. What's different is that across the board, the 32-bit Windows 95 applications have improved reliability and performance advantages over the 16-bit applications—and that adds up to more efficient computing.

Software and hardware incompatibilities will undoubtedly arise as Windows 95 applications ramp up. But there's no doubt that these applications were worth the wait and will advance the Windows platform—if not by a giant step, then by several human-size ones.



INSTA-FAX: Built-in fax support in Microsoft Windows 95 can be used by applications such as Sidekick 95.

application development occurring for Windows 95 than for the Macintosh or OS/2, the new Windows will continue to offer a broader array of choices than its competitors.

Not surprisingly, Microsoft is

WINDOWS 95 SUITES

Microsoft Office 95: An Evolutionary Step Forward

By Edward Mendelson
and Craig Stinson

Microsoft Office for Windows 95 is an evolutionary upgrade to Microsoft's popular application suite, and unless you're impatient for the radical document-centered features and suite-wide automation that Microsoft promises for the future, you'll probably be pleased by Office 95's many conveniences and improvements. The basic package, which carries a price of \$499, includes new versions of Excel, PowerPoint, Word, and (for the first time in Office) Schedule+. Office Professional for Windows 95 (\$599), scheduled to ship this fall, adds a new version of Access.

The biggest changes for Office 95 are the new Shortcut toolbar (which replaces the Microsoft Office Manager) and the Binder application (which can create a single file containing sections built from the various Office 95 com-

list of help topics in response. While the annoying spinning arrow in the dialog box can't be turned off, the Answer Wizard is an impressively intelligent and useful tool.

The on-line help is the only thorough documentation that comes with the package, because the printed manual has been replaced by a task-oriented guidebook that's packed with detail, but has not been designed as a reference tool. At any time you can click on The Microsoft Network icon to browse the program's forum (see review on page 42).

The customizable Shortcut bars sit either at the screen's edge, like the Windows 95 Taskbar, or anywhere else as an icon palette. You can use the Shortcut bar to cycle through multiple toolbars with icons that access desktop items, programs from the Start menu, or the contents of any directory.

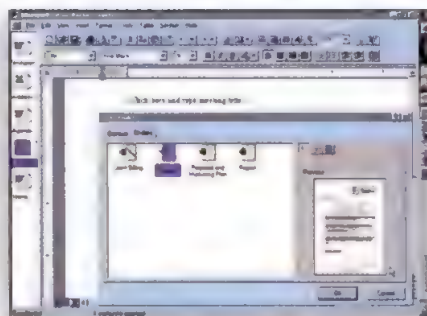
A big timesaver is likely to be the Shortcut bar's icons for File New and File Open dialog boxes. File searches from the Shortcut bar's File Open dialog produce remarkably fast results. This is because Office 95 inserts a background file indexer in your Startup group during installation.

The index can be customized, but you have to navigate through an awkward and laconic dialog box accessible from Control Panel.

We expect that some users may be irritated by Microsoft's failure to ask permission before installing a program that litters the disk with index files. A less intrusive program added by the installer to the Startup group caches some shared code from Office 95 applications for greater performance.

Because Office 95 does not yet have a suite-wide macro language—the programs support OLE automation, but Word still

uses Word BASIC, not VBA—the Shortcut bar lacks the power of the comparable Desktop Application Director (DAD) in Novell's PerfectOffice. Office 95's new Binder application is an OLE



BINDER: Each section of a file created in the Binder is edited by a separate Microsoft Office for Windows 95 application; the icon at left highlights the file's native application.

container that embeds files from one or more Office 95 apps in a single file that can be copied or e-mailed like any other file.

The Binder screen displays a column of icons on the left representing the creation applications, and a thumbnail view on the right. Sections of Binder files can be dragged to the desktop as separate "scrap" files.

The technology looks impressive. Lotus's Word Pro (see review on page 44) has the same functionality, but with the ability to embed or link files from any OLE server application. By contrast, the Office 95 Binder can embed only Office 95 files and those from applications designed to work with the Binder.

Office 95 applications display varying levels of improvements. Word 95 is very close to Version 6.0, although it's notably faster. The big changes include optional on-the-fly flagging of misspelled words and enhanced automatic formatting by converting a hyphen or asterisk at the start of a paragraph to a bullet.

The automated spelling-correction features of Word 6.0 are now available throughout the suite. The built-in address book pioneered by WordPerfect is also a feature in Word 95, with the added convenience that you can insert addresses from The Microsoft Network, Schedule+ 95, or Access. Word 95 also imitates WordPerfect's ability to find and

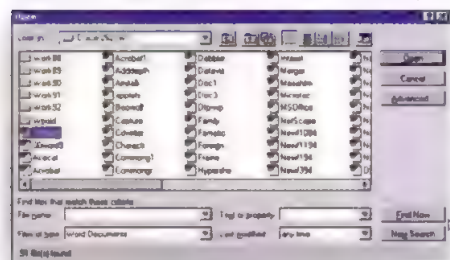
replace multiple word-forms like *buy* and *bought*. An installation option lets you use Word as your Microsoft Exchange editor.

Compared to Word 6.0, the new version loads more slowly (typically 8 seconds compared to 5), but performs most other operations faster. Saving a Word file in WordPerfect format, for example, is 60 percent faster).

Excel 95 offers significantly faster performance, better list-management services, the ability to generate maps from geographic data (a feature introduced with Lotus 1-2-3, Release 5), and much-improved help for the VBA programmer. In addition, the inclusion of Visual Basic's Data Access Object eliminates the need to write data management applications with clumsy



STAGE MANAGER: While you present a slide show across your network, PowerPoint supplies your screen with cues.



COMMON: Microsoft Word and Microsoft Excel now use the Windows-standard common dialog box instead of the custom dialog boxes found in earlier versions.

ponents). Word 95 and Excel 95 use the same file format as earlier versions, while PowerPoint 95 and Schedule+ 95 use new file formats. As is the case with Works 95 (see review on page 40), the CD-ROM version of Office includes Microsoft Bookshelf 95.

Novice Office 95 users will be assisted by an enhanced help engine that is part of each application. Unless you turn it off, a Tip Wizard toolbar appears when you do anything that may be puzzling, and tells you what to do next.

A separate Answer Wizard dialog box lets you type in questions in ordinary English, and offers a

XLODBC function calls.

During evaluation, we measured gains of 71 percent in recalculation speed, 49 percent in opening a large file, and a whopping 361 percent in saving a file. Expect variations based on how you work, but Excel 95 is a

First Looks

swifter performer than Excel 5.

Like PowerPoint 95, Excel 95 incorporates the AutoCorrect feature that was introduced earlier with Word. AutoCorrect fixes user-specified typing errors and expands predefined abbreviations on the fly. The AutoComplete feature saves keystrokes and ensures consistency by scanning upward and downward in the column for similar entries, and offers to complete your entry if it finds a match. The status bar can now show the calculation result of any selected cell range, eliminating the need to write formulas for simple ad hoc calculations.

The links to Access expand Excel 95's use as a database front end. You can now create validating forms for data entry on Excel 95 lists, harness Access as a report generator for Excel 95 tables, and even convert spreadsheet lists into relational tables for use in Access. A new wizard also simplifies the creation of templates and automatically creates data tables (in Access, Excel, or another ODBC-compliant database format) to track the values of particular template cells.

PowerPoint 95 includes several new features designed to facilitate the effective use of presentations. While showing slides, for example, a presenter can invoke a Meeting Minder and jot down notes. Separate tabs on the Meeting Minder transmit notes to a Notes page, a Meeting Minutes page, or a newly created Action Items slide. If an Action Items slide is created, these notes become the final slide in the presentation, and can serve as a good meeting wrap-up.

NETWORK PRESENTATIONS

An innovative Presentation Conferencing command lets you present a show across a TCP/IP network. During the conference, the presenter has access to "stage manager" tools, including a timing meter that compares current timings with rehearsed targets, as well as note pages and a navigator for executing ad hoc branches. As with SPC's Spotlight XL, the presenter sees the cues while the audience sees only the slides. Presentation Conferencing breaks new ground, however, by allow-

ing participants to annotate slides with mouse movements and have their annotations seen by other conference participants.

To help with slide creation, PowerPoint 95 offers new textured fills, gradient fills, and semi-transparent fills, as well as an option to sample the slides in black and white. A new toolbar provides mouse-click selection of animation effects, which now may be applied to clip art and other OLE objects, as well as text. Better multimedia support allows you to run music continuously in the background of a slide show.

3-2-1 CONTACT

The new Schedule+ 95 encroaches somewhat on the territory of Act! and Packrat, without quite

becoming a full-fledged contact manager. You can build a database of names, companies, phone numbers, and related information, display that data in a variety of formats, and use Schedule+ 95 to dial (but not log) your calls. Other viewing options let you see contacts and tasks alongside your appointment calendar, as well as tailor the span of your calendar to suit your preferences.

A new Meeting Wizard automates the process of scheduling meetings by inquiring about required and optional attendees, required resources, location options, and travel time. An odd addition is the inclusion of a Covey Wizard, which helps you implement the organizational strategies of Stephen R. Covey, as

expressed in *The Seven Habits of Highly Effective People*. If you want to carry your calendar and phone book on your wrist, Schedule+ 95 lets you download data to a Timex DataLink watch.

While not a great leap forward, the improvements contained in Microsoft Office for Windows 95 are, by themselves, more than enough to justify upgrading to Windows 95.

Microsoft Office for Windows 95. List price: \$499. Requires: 8MB RAM (12MB recommended), 28MB hard disk space (89MB for full installation), Microsoft Windows 95 or Microsoft Windows NT. Microsoft Corp., Redmond, WA; 800-426-9400, 206-882-8080; fax, 206-936-7329.

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WINDOWS 95 PIMs

Sidekick 95: Power and Grace in a PIM

By David Haskin

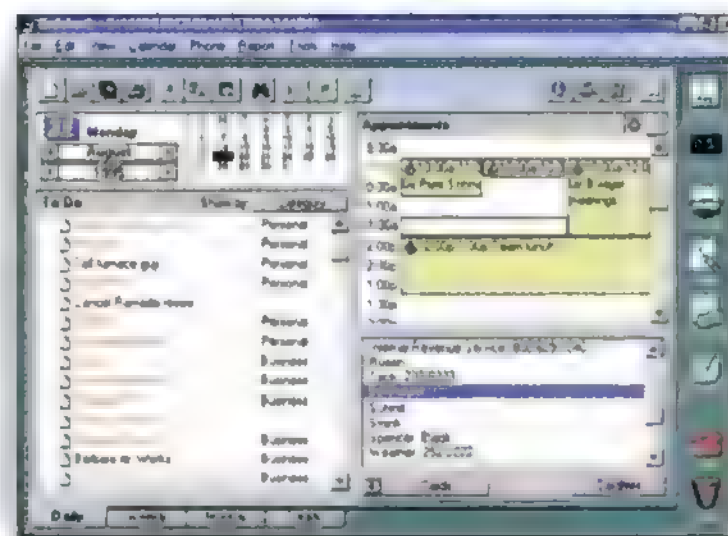
For a decade, Sidekick has been an inexpensive, simple-to-use personal information manager (PIM) with plenty of power for most single users. At a cost to you of \$49.95, Sidekick 95 brings this blue-collar legacy into Windows 95 and remains a powerful bargain.

In addition to changes necessary for Sidekick to run in Windows 95, Starfish Software expanded the program's built-in note taker into a decent low-end word processor, complete with text formatting and drag-and-drop editing. There is now an integrated spell-checker, but you can't save disk space by using your word processor's spelling module instead.

As before, merge fields and precreated templates speed the creation of form letters. You can start letters by dragging names from your contact lists, called cardfiles, to Sidekick 95's word processing documents. Your Exchange address book can act as a Sidekick 95 cardfile, making sending e-mail and faxes a seamless process. The newly improved contact manager shows a contact history for selected records.

The calendar's daily, weekly, monthly, and yearly views remain largely unchanged. While there

are no schedule conflict warnings, overlapping appointments in Sidekick 95 are hard to miss. You can create a report showing free



QUICK STUDY: Sidekick 95's interface is self-explanatory and can display a lot of information.

time slots, as well. While Sidekick 95 complies with the Windows 95 TAPI specification, the program's telephony capabilities offer little benefit (other than simplifying modem selection) over older technology. To use Sidekick 95's phone dialer, just drag a name from the cardfile to the telephone icon; future upgrades will offer Caller ID and speaker phone support.

Sidekick 95 has several pleasant surprises, such as an expense reporting feature that logs expenses and quickly creates a report. The Earth Time module displays a Mercator projection world

map showing the current time in cities you select, as well as which ones are in daylight and which in darkness. The built-in backup and restore capabilities simplify moving files between two computers, but you can only reconcile calendar entries, not specific cardfile records.

There are a handful of minor quirks in Sidekick 95. For example, when searching cardfiles you can use the AND and OR Boolean operators, but you can't use them when searching in other modules. Nor can you search on multiple cardfile fields. Also, Sidekick 95

sorts its to-do list from low to high priority. Placing high-priority tasks on top requires resorting every time you start the program. The calendar does not go beyond the year 1999.

Sidekick 95 made the transition to Windows 95 with grace, and provides even more simple-to-harness power than before.

Sidekick 95. List price: \$49.95. Requires: 4MB RAM (8MB recommended), 5MB hard disk space, Microsoft Windows 95. Starfish Software, Scotts Valley, CA; 800-765-7839, 408-439-0942; fax, 408-461-5900.

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WINDOWS 95 INTEGRATED SOFTWARE

Microsoft Works 95: The All-in-One PC Powerhouse

By Edward Mendelson

Microsoft Works 4.0 for Windows 95 combines word processor, spreadsheet, database, and communications modules in a single integrated package that boasts dazzling automation. This \$54.95 basic program takes advantage of

can help with things like writing a resume, calculating a mortgage, preparing a grade book, or creating a newsletter. Colorful and at times busy-looking screens ask you to enter information such as your name and address, which the program retains for use with other

and a customizable step-by-step mail-merge. You can switch from an editable full-page view to a view without page breaks.

The database module is generally well hidden behind Wizard-built address books and inventory lists, but it can be viewed in four modes: list, standard-database, form-design, and report. There are ten supplied templates, or you can design your own.

The spreadsheet module walks you through common calculations, supports more than 70 functions, lets you edit within cells, automatically adjusts column widths and creates fancy formats, and generates simple charts with customizable labels. The communications module records automated log-on scripts, supports the Zmodem transfer protocol, and can be set to answer an incoming data call automatically.

INFO ON TAP

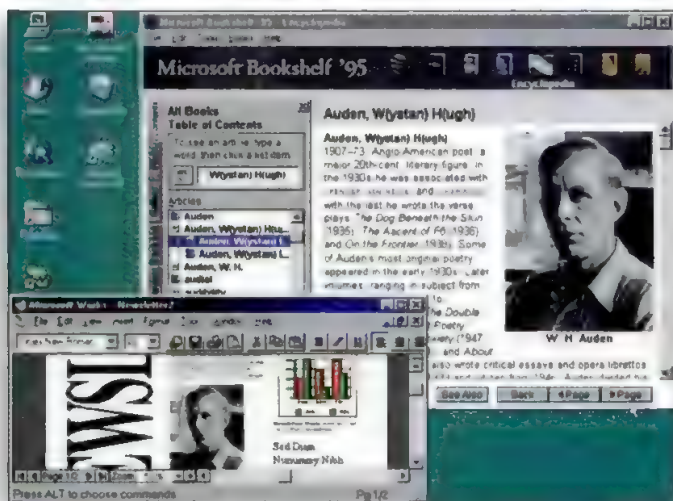
Microsoft Bookshelf 95, included in the CD-ROM version of Works 95, contains abridged versions of eight standard reference works: a dictionary, a thesaurus, an encyclopedia, an almanac, a quotation dictionary, a review of 1994 events, and a ZIP-code directory. You transfer information to Works 95 with standard copy-and-paste methods. Bookshelf 95's level of detail is moderate, but beware of minor errors.

Most of Bookshelf 95's animation sequences and videos are instructive, although some tend to waste disk space. The solar-system video displays a speaker icon but produces no sound. The audio content for animals is not filled with the expected roars, grunts and growls, but instructions on how to pronounce the animals' names. The ZIP-code finder couldn't find a certain address in Manhattan, although it

correctly found the same house number on the street one block north of the one we requested.

Not everything in Works 95 holds together perfectly. The massive Help display covers too much desktop real estate, and you have to click on an icon or use the menu to make it go away. Some Wizards leave a fragment of their final dialog box on-screen after they're finished, and you can get rid of it only by minimizing and then restoring the window. When you type at the foot of a page in the word processor, sometimes only the top half of the current line of text appears until Works 95 moves the line to the next page. In addition, the file management dialog box in the default Task Launcher menu doesn't support Windows 95 right-click menus, so if you want to delete a file, the Help section advises you to use the File Open dialog box.

Works 95 won't supplant Office 95, but with a price less than \$100 and the inclusion of Bookshelf 95, nothing else matches its hand-holding automation or its astonishing depth of help and reference features. Microsoft Works 4.0 for Windows 95 can be your first and last stop in a search for



BOOKSHELF: Included with the CD-ROM version of Microsoft Works 4.0 for Windows 95, Microsoft Bookshelf 95 can copy and paste text or pictures to Works 95 and other applications.

many of Microsoft Windows 95's most interesting features and now stands as the most powerful collection of software ever designed for novice and occasional users. The \$79.95 CD-ROM version adds Microsoft Bookshelf 95 and integrates it into Works 95 from the toolbar. Despite minor glitches, the package looks better and does more than current versions of Claris Software's ClarisWorks and Novell's Perfect Works.

HOW DO I...

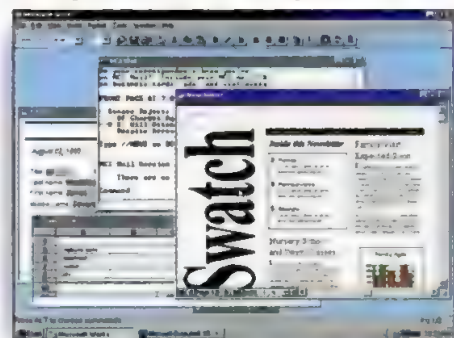
Works 95 has an elaborate hand-holding Help system that fills almost one-third of a typical 800- by 600-pixel display. The system walks you through every step of a variety of typical activities, from naming a file to editing the log-on script for an on-line service. There are also dozens of miniature video clips showing the cursor performing the action you asked about.

The center of attention is the Works 95 Task Launcher dialog box, which lists 39 Wizards that

Wizards. When the Wizard finishes setting up your word processing document, spreadsheet, or database, it leaves you in one of the four main modules, where you can then take over.

In addition to the main modules, Works 95 lets you install the full range of Microsoft's shared applications so you can add modules for drawing and charting, as well as a collection of clip art. Works 95 uses OLE in-place editing, so you may not even notice that you're using the spreadsheet module to insert a table in a word processing document. Works 95 supports drag-and-drop between modules, but it doesn't support OLE 2.0 drag-and-drop to the Windows desktop.

Works 95 has a multitude of high-end features, such as support for multiple columns, footnotes, dozens of descriptively named paragraph styles, bookmarks, automatic abbreviation-expansion (but no keystroke macros), bordered and shaded paragraphs,



MODULAR: Microsoft Works 4.0 for Windows 95 includes word processor, database, spreadsheet, and communications modules, with drag-and-drop data transfer among any of them.

an all-in-one software solution. **Microsoft Works 4.0 for Windows 95.** List price: \$54.95; CD-ROM version (with Microsoft Bookshelf), \$79.95. Requires: 6MB RAM (8MB recommended), 20MB hard disk space, Microsoft Windows 95 or Windows NT. Microsoft Corp., Redmond, WA; 800-426-9400, 206-882-8080; fax, 206-936-7329.

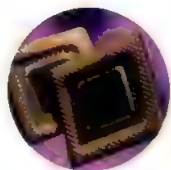
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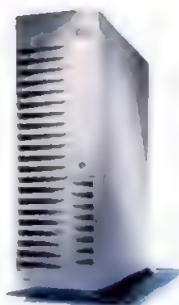
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WINDOWS 95 ON-LINE SERVICE PROVIDERS

The Microsoft Network: The One-Click Connection to Win 95 Applications

By Kevin Reichard

Initially, The Microsoft Network (MSN) will stand out not for its content, but for its ability to link directly with Windows 95 applications. With MSN included in Windows 95, Microsoft hopes to create an instant on-line presence to rival the Big Three—America Online, CompuServe, and Prodigy. But although the variety of information and services available on MSN is similar to—though not as deep as—its competitors, the service suffers from sluggish performance.

At press time, Microsoft had over 50 MSN content providers, from Gateway 2000 to *USA Today*. The on-line services supported on MSN include merchandise sales, information, customer support, chat rooms, and more. The key MSN advantage is that you're never more than one mouse-click away from the on-line service. For example, if the help section of any of the Office 95 applications doesn't prove fruitful in solving your particular problem, clicking on the MSN icon will take you to a listing of Office 95 forums on MSN.

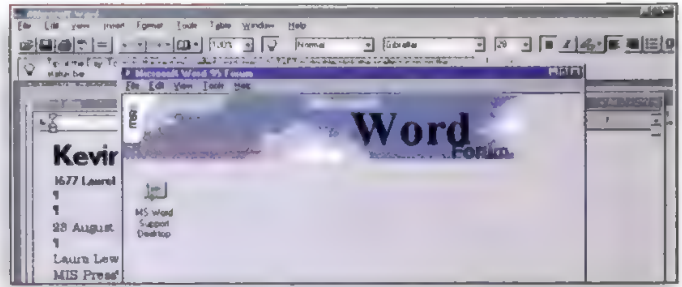
During evaluation, we found that getting to any MSN forum was seamless, but not very sophisticated; just click on the MSN icon, log on to MSN, and you're transported to the particular forum. What you do from there depends on your needs and what the forum provides. For example, in the Visio Forum, we sent requests about problems to Shapeware's technical support staff, and browsed through a listing of products available from the company.

There are MSN forums for Broderbund, Claris, MapInfo, Metz Software, Mustang Software, STAC Electronics, Symantec, and others. Most of the product support forums we looked at were similar to those available on CompuServe and America Online. The next step for MSN would be to increase the level of interactivity by including the op-

tion of ordering software after you enter a credit card number.

Compared to other on-line services, the Microsoft Network looks glitzy. Graphics are splashy, and MSN has the look and feel of Windows 95. For example, you can dress up e-mail or forum messages with colors, bitmapped graphics, OLE objects, and more. Another nice touch is that you can display several windows from different areas of MSN concurrently, which allows you to cut and paste information efficiently between windows. In addition, MSN Shortcuts can be copied from the desktop to a document. This lets you embed a road map to a particularly interesting forum inside a Word for Windows document, for instance.

Even when we were connected to MSN at 28.8 kilobits per second, performance was sluggish.



ONE-CLICK SERVICE: The Microsoft Network's support forums are just one mouse-click away from the actual application.

Microsoft has said that it will initially limit MSN membership to 500,000, both to bring the software to maturity and to minimize delays based on overloading the service's infrastructure.

Cost is similar to the competition, but light users get a break. The basic account costs \$4.95 per month for three hours of use, significantly less than competitive services; additional connection time costs \$2.50 per hour.

The next step for MSN is an Internet Wizard, which is part of the Plus! package of Win 95 add-ons. As with MSN, specific Internet areas (like a World-Wide Web or

FTP site) can be directly linked to your desktop with an icon.

The Microsoft Network has the potential to extend the reach of applications fully into the on-line realm. However, until Microsoft improves performance and content, you may find yourself twiddling your thumbs while waiting for the future to arrive. **The Microsoft Network.** List price: \$4.95 per month for 3 hours of use. Requires: 4MB RAM, 6MB hard disk space, Microsoft Windows 95. Microsoft Corp., Redmond, WA; 800-386-5550, 206-882-8080; fax, 206-936-7329. Circle 427 on reader service card

WINDOWS 95 PROJECT MANAGEMENT

Milestones 4.5: A Better Way to View Project Data

By Craig Stinson

If you need a way to depict the tracking of projects graphically, but don't want the heavy artillery and training requirements of traditional project management programs, Kidasa Software's \$199 Milestones, Etc. 4.5, may be for you. It includes both 16-bit Windows 3.1 and 32-bit Windows 95 disks and is easy to learn and use, right out of the box.

Milestones produces Gantt charts—with some considerable splash and flexibility—but does not produce network diagrams, resource leveling, or cost accounting. New in Version 4.5 is the ability to create hierarchical task structures, with subtasks outlined to a maximum of nine levels. The program will roll subtasks into summary bars

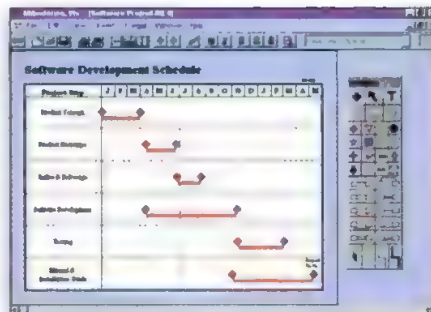
and automatically create a work breakdown structure numbering scheme.

The new version of Milestones also features improved import of

rather than project management, Milestones offers some Gantt-chart options that are missing in many traditional project management programs. You can create nonstandard time intervals (six-week segments, for example), use some unusual symbols (such as ramp-up connectors) or make your own symbols with the program's built-in designer.

For those who want even less complexity, Kidasa offers a slimmed-down version, Milestones Simplicity, for \$99. It has the look and feel of Milestones, Etc. but lacks task outlining, filtering, sorting, and .MPX import/export. Either version will provide one of the easiest ways to view complex project management data.

Milestones, Etc. 4.5. List price: \$199. Requires: 4MB RAM, 5MB hard disk space, Microsoft Windows 95. Kidasa Software Inc., Austin, TX; 800-765-0167, 512-328-0167; fax, 512-328-0247. Circle 430 on reader service card



SIMPLICITY: Milestones, Etc. 4.5 produces Gantt charts but eschews analytical features.

.MPX files, server support for OLE 2.0, and a user interface that is similar to Office 95's. These changes facilitate the use of Milestones as a charting vehicle for Microsoft Project.

Befitting a product whose emphasis is on project depiction



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WORD PROCESSING

Word Pro 96 Transforms Windows Word Processing

By Edward Mendelson

Word Pro performs feats that no other word processor ever dreamed about. With a street price of \$105, Lotus Word Pro 96 Edition for Windows 3.1—Lotus Development Corp.'s successor to Ami Pro—sprints past its competition (a Microsoft Windows 95 version is due later this year).

The program boasts an impressive list of firsts: It's the first word processor that stores multiple revisions of a document in the same file and can maintain an audit trail of changes. It's the first word processor designed for group editing, with easy consolidation of

contributions and changes. It's the first to implement a fully graphical organization of large, multichapter projects.

The tightly integrated charting, tables, drawing, equation-editing, and image-enhancement modules in Word Pro retain the desktop publishing strengths of Ami Pro 3.0a, but in place of Ami Pro's weak text

editing, Word Pro offers most—although not all—of the industrial-strength features of Microsoft Word for Windows and WordPerfect for Windows.

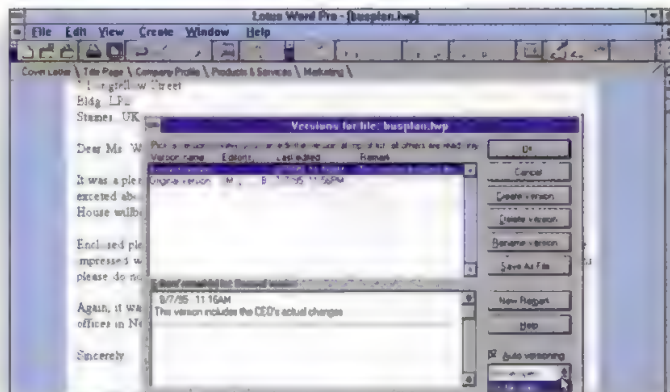
Word Pro's versioning feature blows away the competition in much of the legal, government, and publishing market. No longer must you laboriously save separate versions of a document in separate files; a single Word Pro file can store multiple versions, saving only the differences between them, not the full text of each—thus conserving disk space. You can save the current state of the file as a new version at any time, or you can tell the program to save a new version automatically at predefined intervals. You can delete versions without delet-

ing the rest of the file, and when you export a version as a file, you also export the earlier versions. You manage group editing in much the same way. Each author creates a new version of the file, complete with highlighted annotations and pop-up notes that can include tables, graphics, or OLE objects. Access controls let the file's administrator (called the editor) limit each author's ability to export the file or modify its stylesheet.

Word Pro displays each author's changes with a characteristic color. At the end of the process, the editor saves each version to a separate file and opens a consolidation toolbar that makes it easy to incorporate some or all of the changes made by each author. A future version of Word Pro will eliminate the extra step of saving separate files.

The basic interface resembles the familiar Ami Pro screen, with Lotus's standard SmartIcons. But everything else is radically improved. The spell-checker and similar dialog boxes appear at the top of the window so they don't obscure the text, and you can easily switch between text and dialog box. The spell-checker can display misspelled words as you

also lets you divide a file into tabbed sections and collapsible subsections, each with a different layout or based on a different stylesheet. The tabs can include OLE objects, such as complete embedded or linked documents.



VERSIONS: Word Pro lets you create and annotate multiple versions of the same file and store them together.

By dragging a tab you can move sections within a document or from one document to another, and a right-click menu on any tab lets you combine or split sections. The same tabbed dividers let you organize "master documents" in which some or all of the separate sections are linked external files.

Word Pro improves on Ami

formatting to a paragraph.

Like other up-to-date programs, Word Pro supports smart quotation marks, and a format-check feature converts two hyphens to an em dash, expands abbreviations, and corrects common misspellings. Unlike Word and WordPerfect, which require add-ons to create HTML documents for the Internet, Word Pro supports built-in HTML (com-

plete with tables, but no fill-in forms); it opens files directly from World-Wide Web and FTP sites.

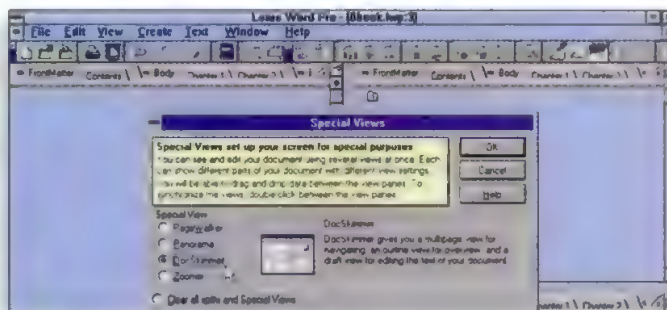
A few features remain unfinished. Cross-references to pages require intensive manual labor in an unintuitive dialog box that manages fields; cross-references to paragraph numbers aren't supported at all. The keyboard can be modified through the LotusScript macro language now shared by all Lotus SmartSuite applications, but there's no interface for casual users to create new key assignments without learning how to program.

Unlike Word and WordPerfect, in which many new features seem awkwardly tacked on, Word Pro feels seamlessly integrated, consistent, and logical. With its spectacular innovations and its unparalleled ease of use, Word Pro transforms the landscape of word processing for the better. **Lotus Word Pro 96 Edition for Windows 3.1.** Estimated street price: \$105. Requires: 8MB RAM, 35MB hard disk space, Microsoft Windows 3.1 or later. Lotus Development Corp., Atlanta, GA; 800-343-5414, 770-391-0011; fax, 770-698-7656.

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From September 25 through 29, you can go on-line to discuss Lotus Word Pro 96 with product manager Joyce Reynolds and reviewer Edward Mendelson. Type GO EXEC from any CompuServe! prompt.



VIEWING: Multiple view options let you display three or more different views of the same file, all editable.

type, or display all misspelled words at one time.

Word Pro can display multiple views of the same document on-screen at the same time; built-in options let you divide the screen into a full-size view of the current page, thumbnail images of multiple pages, and an outline view of the whole document. Word Pro

Pro's pioneering one-stop formatting dialog box by using a modeless dialog box that can stay on-screen in either full or collapsed form. Changes that you specify in the dialog box appear instantly in your text. Word Pro eliminates Ami Pro's irritating requirement that you create a new named style when you apply advanced custom



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HOME PCs

HP Pavilion: Style, Price, and Performance

By Bill Howard

When it comes to home PCs, Hewlett-Packard Co. is the newest kid on the block, but one with the aspirations and ability to become the market's 800-pound gorilla quickly. HP enters the home market with its Pavilion series of Microsoft Windows 95 systems that take aim at the market leaders.

HP pushed all the right buttons with the Pavilion 7050's design. This is a serious effort that results in one of the best home or SOHO PCs you can buy today.

In terms of price, we expect HP will attempt to split the difference between Packard Bell at the low end, and Compaq at the high end. If a Packard Bell system sells for \$2,000 and Compaq for \$2,400, HP would like to sell at \$2,200.

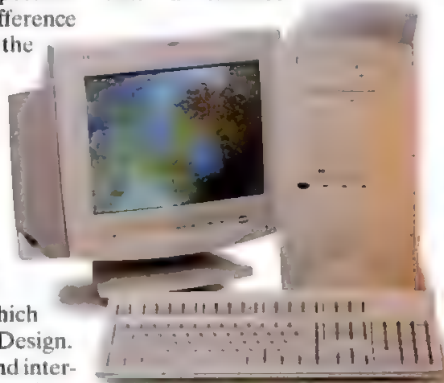
The first thing you notice about the Pavilion is its industrial design, which was created by Lunar Design. With its rounded edges and interesting curves, the Pavilion isn't quite as swoopy as Acer America Corp.'s Aspire, but you still won't mistake the Pavilion for a standard desktop PC. The mini-tower

chassis bulges ever so slightly in the middle, there's a playful curve built in to the floppy disk drive bay, and the front panel has a sharp inward crease.

The system's 15-inch monitor contains a 2.5-watt amplifier and Altec Lansing speakers that clip on to each side. The front panel includes a built-in microphone, a headphone jack that disables the speakers, a volume control, and a mute button,

which is a big plus and ought to be required equipment on every multimedia PC, no matter how big and convenient the volume control.

The system unit—engineered by HP and built by SCI Systems in Alabama—has six drive bays, five ISA slots, and two PCI slots. The only occupied slot holds a Prometheus Zephyr 14.4-kilobit-per-second (Kbps) voice modem (V.32bis) that, unlike the rest of the system, is not plug-and-play-compliant. A plastic modesty panel gives the back of the unit a finished



CURVE BALL: The curved design of the Pavilion is in stark contrast to the squared edges of most PCs.

look, and most of the cables are color-coded. Oddly, the Serial 1 and Serial 2 ports are labeled in plain English, while the rest get icons. Some are clear; some aren't. Even experienced PC Lab reviewers had trouble recognizing all the icons.

The sound-based activities, including voice mail and speakerphone, are vastly simplified thanks to the audio controls on the monitor. The speakers are fine at low and medium volumes, but would benefit from a separate subwoofer that HP may offer optionally.

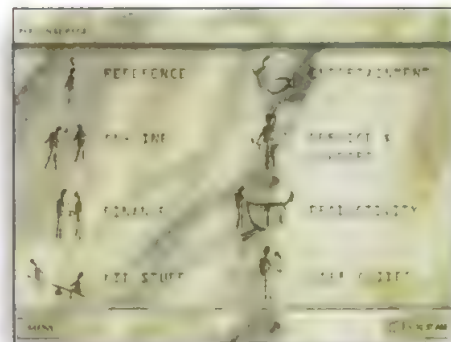
Our test unit had a 1.2GB hard drive, 16MB of RAM, and a quad-speed CD-ROM drive along with the 100-MHz Pentium CPU and 256K of external processor cache. The Intel motherboard is based around the third iteration of Intel's Triton chip set. An instructive welcome-mat poster simpli-

fies setup so that even first time users should be up and running in half an hour.

The Pentium/100 Pavilion we tested was on a par with a 90-MHz Pentium system. The Pavilion produced a Winstone 95 score of 118, which is just ahead of the Winstone score posted by a Pentium/90-based HP Vectra XU. The emphasis of the Pavilion is not raw speed, but reliability, software, and ease of use.

The Pavilion's user-friendly front end is called Personal Page. Unlike Microsoft's Bob, this is not so much a social statement as it is training wheels. In use, we found Personal Page approachable for novices without being an impediment to skilled users.

Personal Page breaks your applications into eight areas, including Entertainment, Finance, Kid Stuff, On-Line, Reference, Productivity, Service and Support, and User Guides. In one version of the interface, each area is accompanied by an animated caveman-drawing stick figure representing the activity. You can also make Personal Page's icons look like a comic book or animators' sketches. If you're confused by a menu choice and your mouse hovers for more than a second, a utility called HP Coach gives a spoken explanation and pops up a text balloon. A kids' mode lets you leave the Finance section off the menu.



WRITING ON THE WALL: The Pavilion's Personal Page divides your applications into eight iconic groups.

More than 40 applications come with Pavilion and reside under the menu icons, primarily Microsoft programs: Microsoft Bookshelf, Encarta, Explorapedia, Money, and Works; Intuit's Quicken; 4Home Productions' Simply House and Simply Kids; and Novell's Memphis Math, Read With Me, and Write with Me. You also get starter kits for four on-line services, including The Microsoft Network.

HP priced the base Pavilion without a monitor (\$450) and with 8MB of RAM at \$2,199. As tested, our Pavilion system should sell for between \$2,750 and \$3,000, depending on how aggressive the dealer is on pricing.

This is a well-designed system, but because the competition is so intense, there is no clear standout in the market. Count the Pavilion as an equal among firsts.

Hewlett-Packard Pavilion 7050. Estimated street price: With Pentium/100 CPU, 16MB RAM, 256K external cache, 1.2GB hard drive, CD-ROM drive, 14.4-Kbps modem, \$2,900. Hewlett-Packard Home Products Division, Santa Clara, CA; 800-724-6631.

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BENCHMARK TESTS



HP Pavilion 7050

The Pentium/100-equipped HP Pavilion 7050 posted a Winstone 95 score that was just above that of a comparably equipped Pentium/90-based HP Vectra XU.

We used PC Magazine Labs' Winstone 95 to gauge the performance of these two systems. Each was equipped with 16MB of RAM and 256K of external cache, and each ran Windows 95.



From October 2 through October 6, you can go on-line to discuss the Pavilion PC series of personal computers with Hewlett-Packard Home Products manager Greg Jones and PC Magazine executive editor Bill Howard. Type GO EXEC from any CompuServe I prompt.

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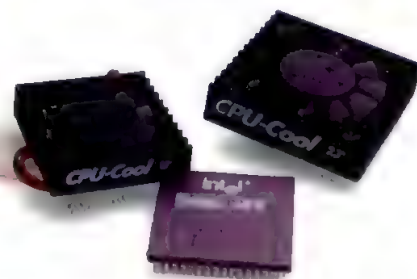
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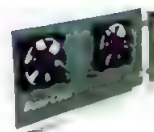
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ON-LINE SERVICES

Interchange: The Publisher's On-Line Service

By Rick Ayre

AT&T Interchange Online Network is now in launch mode, and as befits an on-line service that is different from the established Big Three on-line service providers (America Online [AOL], CompuServe, and Prodigy), its launch is a little different, too. The main difference is that Interchange is not really an on-line service in the mold of the Big Three. Interchange should be thought of more as a conduit for others to deliver their services.

AT&T calls Interchange an on-line publishing platform, and what makes it so—at least in AT&T's view—is an architecture and a set of editorial tools that are among the best for delivering content electronically. For example, to create a welcoming graphical image that would be analogous to a magazine's cover, Interchange supports reusable templates, so new content can be dropped into an existing visual format quickly. This publishing focus is not unusual in view of the fact that Interchange started a long gestation period as part of Ziff-Davis Publishing Co. (which publishes *PC Magazine*) and was acquired by AT&T in January 1995.

THREE EASY PIECES

At its core, there are three parts of Interchange that set it apart from other on-line service providers. There is the client software, the information you can access while using the software, and the costs you will incur while doing so.

You don't subscribe to Interchange, per se. You subscribe to one of the digital services available on Interchange. Those available now are the Gartner Group's @Vantage (an analyst's toolset for information-technology professionals), The Star Tribune Online (developed by the Minneapolis/St. Paul *Star Tribune*), the *Washington Post's* Digital Ink (a one-stop news source), and Ziff-Davis Interactive's ZD Net (an information service for computer professionals).

The problem is that the list of

companies providing services on Interchange hasn't grown by leaps and bounds since it was announced. In fact, the list has gotten smaller, with some publishers—such as IDG's InfoWorld—pulling out. But even though the number of content providers isn't large, there is a nice mix of products available, from local news to professional analyses.

Graphics play a prominent role

to read the material and prepare replies in the morning over coffee. Other on-line services can provide off-line retrieval, but only with the use of add-on products.

Like most everything in the on-line world, final pricing is a fleeting thing. As we went to press, all of the current services have announced some pricing. ZD Net, for example, will cost \$5 a month for 5 hours of connec-

(MSN) charges \$4.95 per month for 3 hours of connection time, and an additional \$2.50 for each hour after that; 15 hours of use would cost \$34.95. (For more information on The Microsoft Network, see this issue's First Looks review.)

THE PROGRAMMING CONNECTION

Although Interchange was designed by publishers, it was built by programmers. At times, the results are not all that one might have hoped for.

The software is slow on most machines—though speed and response times have been improving—and some highly regarded features, such as the ability to search across all content, don't work as promised. When we tried to find all mentions of the keyword "Internet," we gave up after a 15-minute wait.

When we dialed the New York City connection node, the phone went unanswered. The Interchange client then popped up a dialog box that stated that it was "Unable to connect to network," and asked us to try again later. The fact that dialing software with the ability to redial automatically has been available for years must have been lost on the Interchange developers.

Finally, Interchange must run over telephone networks. With a top supported connection speed of 14.4 kilobits per second (Kbps), expect to spend some time waiting for your data to come and go. At this point, America Online leads the way with 28.8-Kbps support; CompuServe and Prodigy are phasing it in over the next several months.

Interchange was a dynamite idea when it was announced in 1994. It was still an exciting idea when it should have been delivered last year. Now that it has gone commercial, it is an interesting idea that injects some variety into how digital information is delivered to the desktop.

AT&T Interchange Online Network. Requires: 8MB RAM, 10MB hard disk space, Microsoft Windows 3.1 or later, minimum 9,600-bps modem. AT&T Interchange Online Network, Cambridge, MA; 800-299-9699, 617-252-5000; fax, 617-252-5299.

Circle 425 on reader service card



THE LOOK, THE FEEL: AT&T Interchange Online Network integrates a graphical look that allows the quick updating of content.

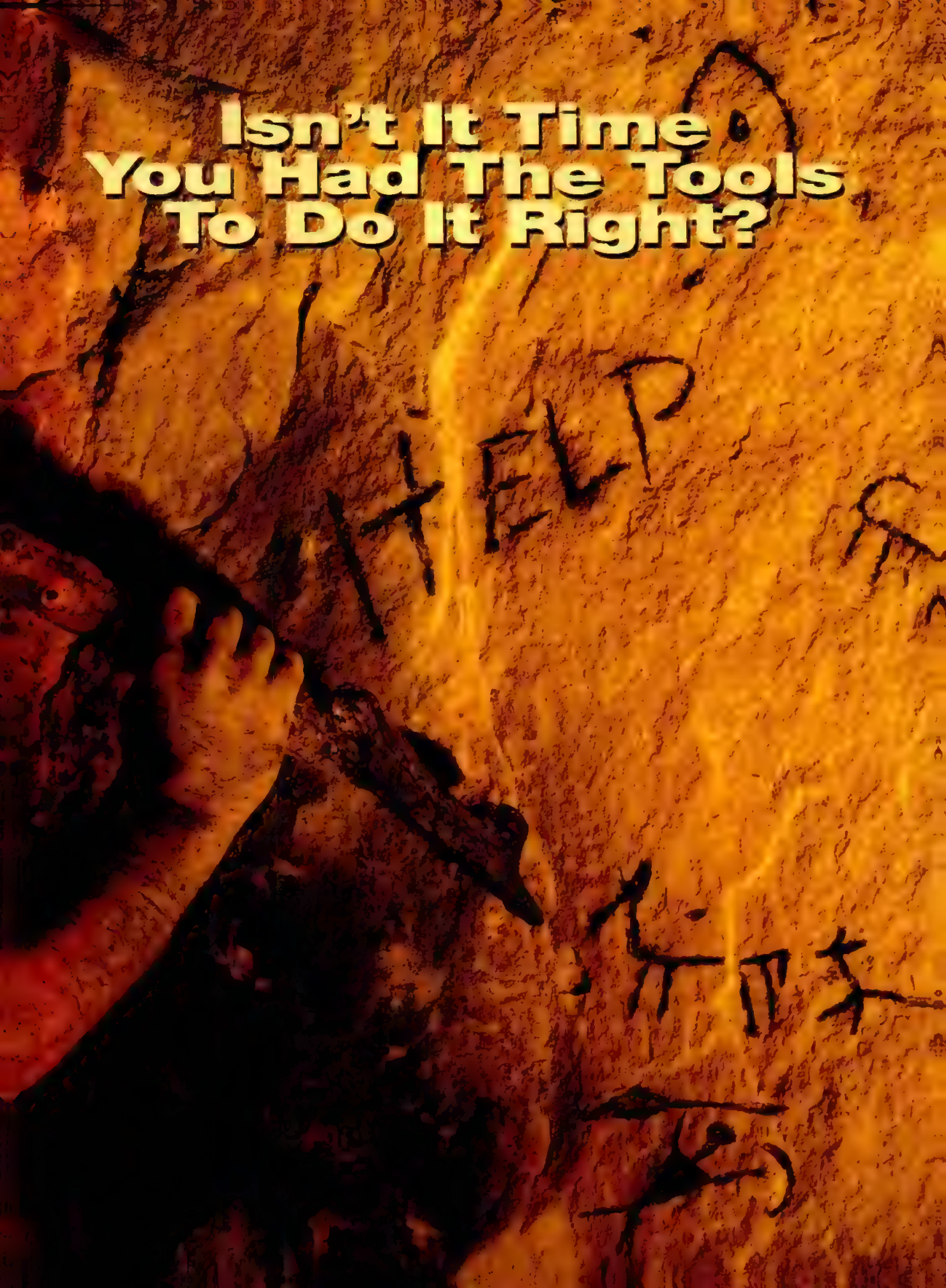
in how the information is presented on Interchange, and effective linking brings things to the surface that might otherwise have been buried. For example, while we were reading through a message thread we came across a reference to a product that we were interested in. We were able to create a link to a review of that product, even though it was in a different section of Interchange.

At the moment, only an Interchange Windows client is available, but that is just about the sole limitation that is imposed on users. With the client, you can choose to work in batch mode or in real time, or some combination of the two. During our evaluation, we were able to download a file in the background while reading e-mail. Using batch mode, we also scheduled our computer to download all of our message threads and e-mail overnight, allowing us

to read the material and prepare replies in the morning over coffee. At least that's the way it will be from now until the end of the year. At that point, the final pricing, \$9.95 a month, is supposed to kick in. Most areas of ZD Net are free except for those charges, but there are a few premium areas, such as Computer Database Plus, which charges \$1 for the full text of articles from non-ZD magazines.

This strategy goes against the grain of the one-fee-gets-all approach taken by the Big Three. AOL, CompuServe, and Prodigy each have a variety of payment plans but each offers 5 hours a month of connection time for \$9.95, with additional time costing \$2.95 per hour. If you spend 15 hours per month on-line, using one of the Big Three services will cost you about \$40, compared with \$34.50 for Interchange. The newly launched The Microsoft Network

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Pentium-66
April 12, 1994
DX4-100
June 28, 1994



Pentium-60
April 1994
Pentium-90
August 1994



486DX2-66
January 1994
February 1994
March 1994
June 1994
December 1994
Pentium-60
January 1995
February 1995
March 1995
April 1995

DX4-100
October 1994
November 1994
December 1994
Pentium-60
December 1994
January 1995
February 1995
April 1995

Pentium-66
June 1994
July 1994
August 1994
September 1994
Pentium-90
August 1994
September 1994
October 1994
November 1994
January 1995
February 1995



Pentium-66
May 1994
Pentium-90
February 1995



Pentium-66
June 1994
Pentium-90
August 1994



Pentium-90
November 1994



Pentium-90
May 1995

Package 1		Package 2		Package 3		Package 4	
486 & DX4 Processor-based Panteras							
486DX2-66	\$1495	486DX2-66	\$2095	486DX2-66 CNI	\$2495	486DX2-66	\$2995
DX4-100	\$1595	DX4-100	\$2195	DX4-100	\$2595	DX4-100	\$3095
Pentium® Processor-based Panteras							
75MHz	\$1695	75MHz CNI	\$2295	75MHz CNI	\$2695	75MHz	\$3195
90MHz	\$1795	90MHz	\$2395	90MHz CNI	\$2795	90MHz	\$3295
100MHz	\$1945	100MHz	\$2545	100MHz	\$2945	100MHz CNI	\$3445
120MHz	\$2145	120MHz	\$2745	120MHz	\$3145	120MHz CNI	\$3645
133MHz	\$2295	133MHz	\$2895	133MHz	\$3295	133MHz	\$3795
➤ 8MB RAM (Pentium processor-based Panteras include EDO RAM) ➤ 528MB local bus EIDE hard drive, 14ms ➤ 3.5" 1.44MB floppy disk drive ➤ Diamond Stealth 64 PCI local bus SVGA color graphics card with 1MB DRAM ➤ ZEOS 14" 1024 x 768 non-interlaced SVGA color monitor, .28mm dot pitch ➤ Six-bay desktop case with two cooling fans ➤ Microsoft Mouse ➤ MS Windows 95, or MS-DOS & Windows for Workgroups ➤ MS Works 95 or MS Works		➤ 16MB RAM (Pentium processor-based Panteras include EDO RAM) ➤ 850MB local bus EIDE hard drive, 11ms ➤ 4X CD-ROM drive and 3.5" 1.44MB floppy drive ➤ Diamond Stealth 64 PCI local bus SVGA color graphics card with 1MB DRAM ➤ ZEOS 15" 1024 x 768 non-interlaced SVGA color monitor, .28mm dot pitch ➤ Six-bay desktop case with two cooling fans ➤ Microsoft Mouse ➤ MS Windows 95, or MS-DOS & Windows for Workgroups ➤ MS Office Pro 95 & Bookshelf 95 CD, or MS Office Pro & Bookshelf CD		➤ 24MB RAM (Pentium processor-based Panteras include EDO RAM) ➤ 1.2GB local bus EIDE hard drive, 10ms ➤ 4X CD-ROM drive and 3.5" 1.44MB floppy drive ➤ Diamond Stealth 64 PCI local bus SVGA color graphics card with 1MB DRAM ➤ ZEOS 15" 1024 x 768 non-interlaced SVGA color monitor, .28mm dot pitch ➤ Six-bay desktop case with two cooling fans ➤ Microsoft Mouse ➤ MS Windows 95, or MS-DOS & Windows for Workgroups ➤ MS Office Pro 95 & Bookshelf 95 CD, or MS Office Pro & Bookshelf CD		➤ 32MB RAM (Pentium processor-based Panteras include EDO RAM) ➤ 1.6GB local bus EIDE hard drive, 10ms ➤ 4X CD-ROM drive and 3.5" 1.44MB floppy drive ➤ Diamond Stealth 64 PCI local bus SVGA color graphics card with 1MB DRAM ➤ ZEOS 15" 1024 x 768 non-interlaced SVGA color monitor, .28mm dot pitch ➤ Six-bay desktop case with two cooling fans ➤ Microsoft Mouse ➤ MS Windows 95, or MS-DOS & Windows for Workgroups ➤ MS Office Pro 95 & Bookshelf 95 CD, or MS Office Pro & Bookshelf CD	
Included With Every ZEOS Pantera:							
➤ Genuine Intel® Processor. ZIF socket for easy upgrading. ➤ Diamond Stealth PCI local bus color graphics card with 1MB DRAM, upgradable to 2MB DRAM. ➤ Flash BIOS for easy upgrading.		➤ Two high-speed serial ports and one enhanced parallel port on the motherboard. ➤ Slots: Three PCI & 4 ISA (486 processor), 3 PCI & 5 ISA (Pentium processor). ➤ ZEOS 101-key space-saving keyboard.		➤ 200 watt power supply with built-in surge suppressor. Switchable between 115/230V. ➤ EPA Energy Star compliant. ➤ FCC Certified Class B; UL Listed. ➤ Complete ZEOS Customer Satisfaction Package.			
486 & DX4 Processors:				Pentium™ Processors:			
➤ Upgradable to Pentium® OverDrive® Processor. ➤ RAM expandable to 128MB.				➤ Upgradable to a future OverDrive® Processor. ➤ 6 SIMM slots for low-cost memory upgrading. EDO RAM expandable to 384MB. ➤ On-board PCI local bus Fast SCSI-2 and Ethernet LAN options.			

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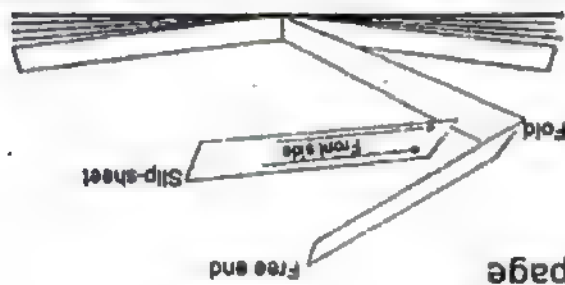
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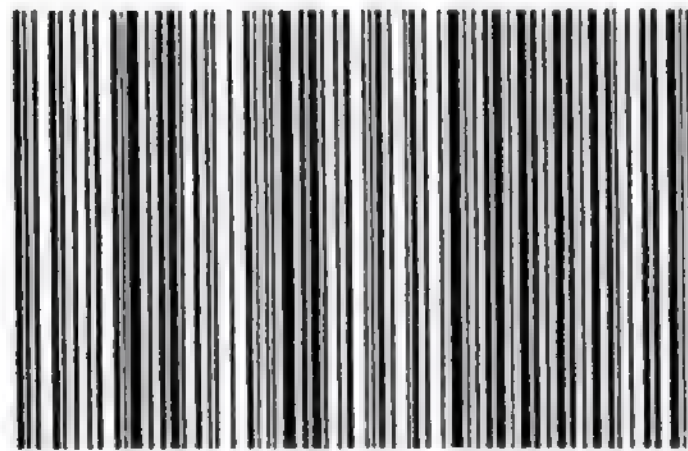
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1. Open the foldout page
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4. Close the page and slip-sheet

Inverted Foldout slip-sheet

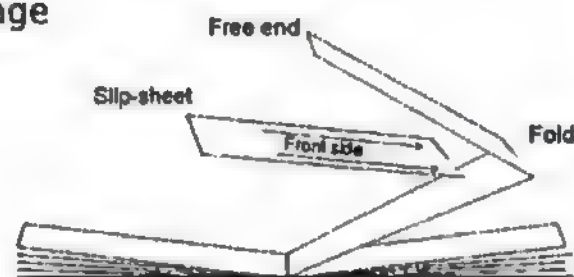


GbsSlipSheet-001

Folded edge of the page

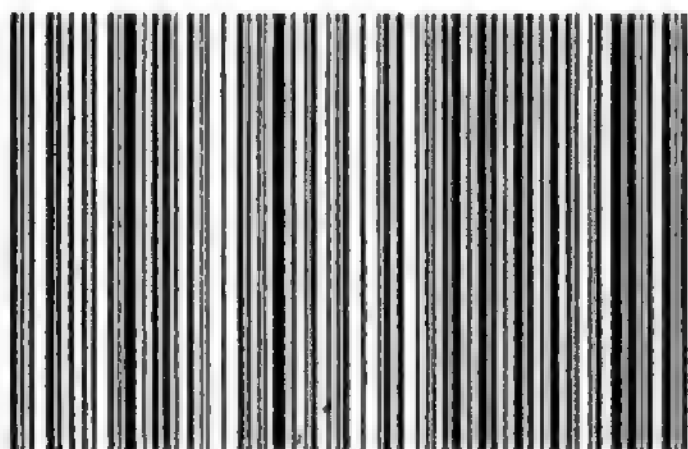
Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



1. Follow instructions on the other side

Inverted Back



Gbs5HpBack-001B

Back

1. Follow instructions on the other side

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Magazine, the Pentium™ processor-based Pantera line is now boosted even further with the addition of EDO DRAM, synchronous burst SRAM cache options and CPU



choices all the way to the brand new 133MHz Pentium processor. In plain English, this all means that we've turned on the afterburners—giving you performance unlike anything you've seen before!

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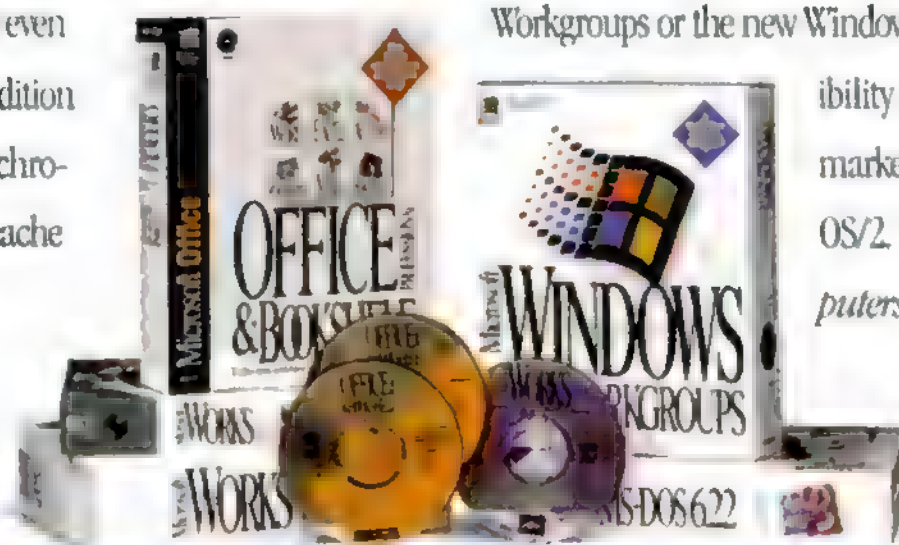


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- 6-bay desktop case
- Microsoft Mouse
- MS Windows 95
- MS Office Pro 95 & Bookshelf® 95 CD

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- Diamond Stealth 64 Video PCI local bus graphics card/2MB VRAM
- 15" SVGA color monitor
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- 10-bay vertical case (90MHz, 100MHz & 120MHz)
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- Extra battery
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- MS Works 95
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- MS Office Pro 95
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CIRCLE 155 ON READER SERVICE CARD

WIRELESS COMMUNICATIONS

Stay Connected Just About Anywhere with ZAP-it

By Brian Nadel

DTS Wireless's ZAP-it is a breakthrough product that lets you use the coast-to-coast RAM Mobile Data wireless network to send and receive e-mail or faxes virtually anywhere in the U.S. Although it is innovative, its price may make the frugal businessperson blanch.

We tested ZAP-it with a \$795 IBM Mobitex Type III PC Card radio modem that sends and receives messages and faxes via a 900-MHz radio link to DTS's server in Woodbridge, N.J.; a bulky Motorola InfoTAC serial-port modem is available for \$749. The PC Card has a 2-watt transmitter that can move data at speeds of up to 8,000 bits per second. Because it covers 7,700 U.S. cities, about the only place where the RAM Mobile Data network can't be used is on an airplane.

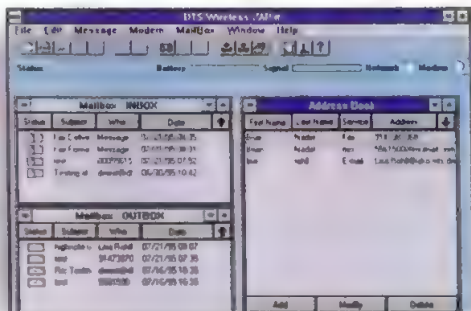
Because the system requires both the ZAP-it software and an included IBM radio-modem utility, installation was time-consuming and awkward. And once we installed it, we found that ZAP-it required COM2, which required us to disable the e-mail program

loaded on our test-bed PC.

ZAP-it configures a wireless account the first time you log on to the radio network. Unfortunately, we couldn't make a connection at PC Magazine's New York City editorial offices, which was likely be-

cause of interference. Outside, the system worked fine, and we made contact almost immediately.

The program's strongest suit is its drag-and-drop interface. On the right-hand side of the screen is a window for the names, addresses, and phone numbers of recipients. Filling the address book may be your most tedious chore with ZAP-it, because you can't import



CONNECT ON THE GO: ZAP-it uses a PC Card radio modem and the RAM Mobile Data network to send and receive e-mail and faxes wirelessly.

the contents from your PIM or contact-manager program. On the left-hand side are windows for outgoing and incoming mail.

ZAP-it can connect to popular e-mail services, including America Online, AppleLink, AT&T Mail,

CompuServe, Delphi, EasyLink, eWorld, GENie, MCIMail, and the Internet. The system can also send and receive alphanumeric pages. Typical outgoing messages took a few seconds to transmit—followed by several minutes to clear DTS's server—before they were delivered. The system neither misrouted nor garbled any test messages.

Two intriguing features put

ZAP-it on the cutting edge of communications. First, you can append your signature, letterhead, or even long documents to any file that ZAP-it processes. And you don't need a computer to receive e-mail. All you do is call DTS's 800 number and have the server read your messages to you via a sophisticated text-to-speech system.

The two biggest drawbacks are its price and the fact that you can't connect the PC Card modem to a wired phone connection, which means you'll need two modems when you travel. ZAP-it costs \$34.95 to establish an account and \$9.95 per month after that, with specific charges added on depending on usage. While 39 cents per e-mail sent or received may not sound like much, the bill adds up quickly; a frequent e-mailer could easily ring up a \$200 monthly ZAP-it tab (in addition to the user's e-mail service charges).

ZAP-it is a technological triumph and a big step forward for those who must stay connected. **ZAP-it.** List price: \$9.95 per month plus usage charge. Requires: 4MB RAM, 1MB hard disk space, Type III PC Card slot, Microsoft Windows 3.1 or later. DTS Wireless, Data Transmission Services Inc., Woodbridge, N.J.; 908-602-1144; fax, 908-602-0990.

Circle 402 on reader service card

CD-ROM ENCYCLOPEDIAS

World Book: An Encyclopedia That Grows with Your Family

By Rubin Rabinovitz

Among the most dazzling data-packed CD-ROMs available are the popular multimedia encyclopedias, which include Microsoft Encarta, Grolier's, and Compton's. A newcomer is The World Book Multimedia Encyclopedia (\$179), which gives you video, graphics, and sound along with the full text of the 10-million-word print edition of The World Book.

This is the CD encyclopedia to get for the home, because The World Book is a good choice for younger readers. Its design is based on ongoing surveys of children's preferences and of class-

curriculum requirements. The CD offers a time line, reading lists, article outlines, review questions, and a 225,000-entry dictionary.

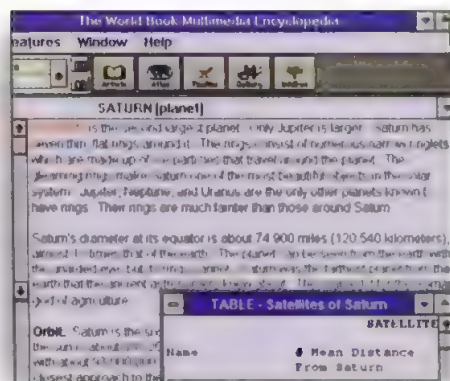
The main competitor to The World Book is Compton's, which is similarly targeted at younger audiences. But while Compton's employs a simple style that tends to become less appropriate as children grow older, The World Book matches the difficulty of articles with the age levels of readers. Where this isn't practical, the basic material in an article is given in plain language before more difficult ideas are introduced.

Mature readers will also appreciate The World Book's ability to

perform keyword searches using Boolean operators, a feature that is absent from Compton's.

The World Book may have more maps (265 versus 126) and tables (1,700 versus 43) than Compton's, but Compton's trumps World Book when it comes to multimedia resources. And while The World Book appeals to a broader age range, Compton's includes more beautiful images. Which is better? That depends on whether you think age goes before beauty.

The World Book Multimedia Encyclopedia, Version 3.1. List price: \$179. Requires: 4MB RAM,



OUT OF ORBIT: World Book's well-designed interface makes it easy to narrow the universe of information.

5MB hard disk space, DOS 3.1 or later, Microsoft Windows 3.1 or later, CD-ROM drive, audio board. World Book Educational Products, Elk Grove Village, IL; 800-621-8202; fax, 800-621-9999.

Circle 401 on reader service card

OPTICAL CHARACTER RECOGNITION

The Brave New World of OCR

By David Haskin

OmniPage Pro has long been regarded as one of the most accurate optical character recognition (OCR) programs available, and Version 6.0 is an impressive upgrade. However, a new kid on the block, ExperVision's TypeReader Professional 3.0XA, makes quite a debut. While OmniPage excels at maintaining character formatting and page layout, it is slightly less accurate than TypeReader at translating scanned text into a digital file—and a bit slower, as well. Which OCR program you choose will depend on your needs.

TypeReader Professional 3.0XA looks and feels like its predecessor, TypeReader Professional. Below the surface, however, the new program has a significantly improved text-recognition engine. By the same token, Caere also tweaked OmniPage's OCR engine in this upgrade. But most of the work has gone into smoothing out the program's interface and adding a few new features, such as the ability to save files in additional formats.

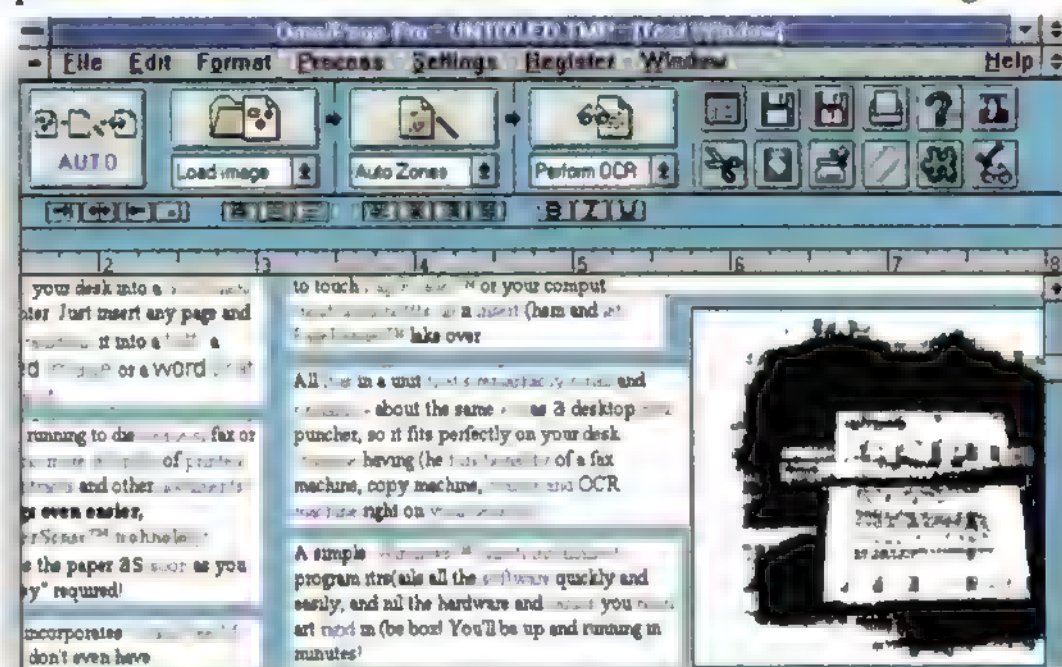
PC GRAY MATTER

Both products use neural net technology to increase accuracy on difficult-to-read pages. Both also use several now-standard OCR tricks, such as automatically rotating and then recognizing pages if you place them in the scanner upside down.

We tested these products with an assortment of pages that are difficult for OCR products to translate correctly. The worst included a series of low-resolution, poorly received faxes and a tenth-generation photocopy. We also tested these OCR programs with pages that contained complex layouts and several different typefaces. Probably the worst page we threw at these programs was a photocopied and reduced four-column magazine article with type varying from 5- to 36-point. Both products produced nearly identical text recognition results: TypeReader had 36 text transla-

tion errors and OmniPage had 37.

However, OmniPage's errors resulted from faulty recognition while almost all of TypeReader's errors resulted from incorrect hyphenation when the document



FAITHFUL REPRODUCTION: OmniPage was excellent at maintaining page layout, including the proper placement of images.

was saved in Word for Windows format. We found that improperly placed hyphens in the middle of words is a problem that is easier to correct than OmniPage's translation errors.

On the same page, OmniPage flawlessly maintained character formatting and page layout, while TypeReader made several errors, such as randomly boldfacing type. TypeReader maintained the order of the document but, when saved to Word for Windows format, it placed the text in columns that didn't perfectly match the original, though they came close.

Another tough test page we used was a spreadsheet that contained 6- and 7-point type and a border around each cell. TypeReader translated both the text and layout perfectly. OmniPage introduced five text recognition errors and placed column headings in the wrong columns—the only time it mishandled page layout during our evaluation.

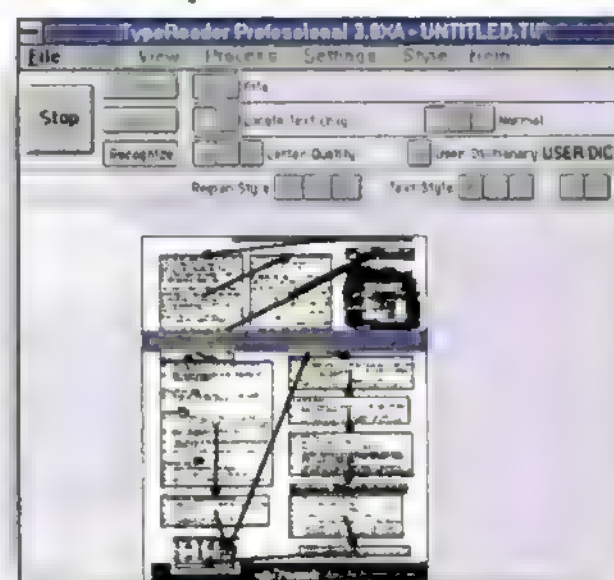
A tougher OCR test is translating skewed pages. OmniPage created random gibberish when translating pages skewed at more than 5 percent; even some low-cost OCR products can do better than that. However, TypeReader

perfectly translated a photocopied business letter skewed by as much as 15 percent.

The only test page from which OmniPage translated text more accurately than TypeReader was a poorly received fax. However, both of the programs produced such disappointing results that rekeying might well have been faster than correcting all of

the OCR-induced errors.

Other than the relatively small problem with spreadsheets, OmniPage was nearly perfect at maintaining both character formatting and complex page layouts. Complex newsletters and



SPARTAN LOOK: TypeReader's user interface is more cluttered and less functional than OmniPage's.

other documents generally looked the same on our PC's screen as they did on paper.

WORTH A THOUSAND WORDS?

TypeReader doesn't include images from the original with translated text, but OmniPage does, maintaining their positions within the document. OmniPage also

comes with Caere's Image Assistant image editing program for touch-ups. If you double-click on an image in OmniPage's viewer, it loads into Image Assistant for touch-up before you export it to other applications.

OmniPage is a bit friendlier to use while TypeReader is faster. OmniPage enables you to turn off the advanced recognition skills that help it translate complex and degraded pages. This speeds up OmniPage's performance on simple pages, but even then it's about 25 percent slower than TypeReader.

TypeReader's interface isn't as refined as OmniPage's, which features large buttons with cute graphical icons. Even newcomers should be able to use OmniPage's toolbar to walk through the steps of the OCR process. TypeReader's interface is also button-based, but it is grayer, denser, and at times more difficult to figure out.

OmniPage Pro's character formatting and page layout skills make it an excellent choice if you use OCR in conjunction with desktop publishing. That's because you can scan in brochures and other layout-intensive documents and lose very little time rearranging the documents' artistic elements. However, OCR software is more commonly used simply to convert a pile of paper documents into editable text files. For that task, TypeReader Professional 3.0XA is faster and more accurate.

OmniPage Pro 6.0. List price: \$695 (upgrade from any Caere OCR product, \$149). Requires: 8MB RAM, 12MB hard disk space, Microsoft Windows 3.1 or later, DOS 5.0 or later. Caere Corp., Los Gatos, CA; 800-535-7226, 408-395-7000; fax, 408-354-2743.

Circle 406 on reader service card
TypeReader Professional 3.0XA. List price: \$595. Requires: 4MB RAM, 12MB hard disk space, Microsoft Windows 3.1 or later. ExperVision Inc., Sunnyvale, CA; 800-732-3897, 408-523-0900; fax, 408-523-0909.

Circle 405 on reader service card

MATHEMATICS SOFTWARE

Mathcad Brings Numbers to Life

By Barry Simon

MathSoft's Mathcad 6.0 has redefined the market for mathematical software by including just about everything you'd ever want from computational software and putting it in an easy-to-use package. Available at \$129.95 for the Mathcad 6.0 Standard Edition, and \$349.95 for the Plus Edition, Mathcad 6.0 is a big step forward for mathematical software.

Major new components include a simple but mathematically elegant programming language, animation, built-in templates to help new users get up to speed, and communications links to the World-Wide Web. Mathcad, however, falls short in terms of Windows 95 support.

The basic paradigm of working with spreadsheets of formulas remains essentially unchanged from previous versions of Mathcad. There is a multitude of built-in functions, including equation solvers and the basics of symbolic math. Version 6.0 allows you to open up multiple worksheets at once, and to drag formulas from one worksheet to another.

MATH ON THE WEB

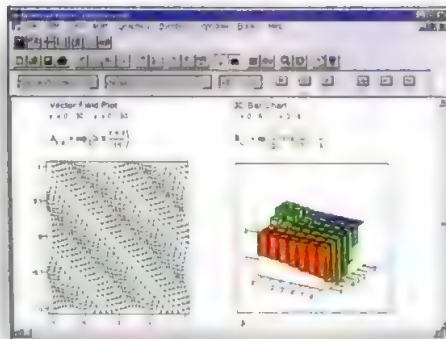
Many users will find the World-Wide Web component of Mathcad the program's most spectacular development. If you're connected to the Internet, a Mathcad menu command will link you directly to MathSoft's home page. There, you'll find an assortment of Mathcad documents that can be moved directly into the program.

You can then do live spreadsheet-type mathematics on the Web documents and drag all or part of them to your local documents. This allows MathSoft to make available a greater variety of functions and services than would be possible with a disk-only program. For example, the Web site includes an on-line tour of Mathcad, an astronomy section, and an assortment of unsolved mathematical problems.

MathSoft is interested in estab-

lishing Mathcad as the standard for mathematics on the Web, and will be offering a free viewer for Mathcad that can be linked to your Web browser. This attempt to become the Internet's *lingua franca* for math is likely to be blunted by the existence of TeX, the de facto standard for scientific and mathematical publishing.

While TeX files can't include live mathematical formulas, their more precise formatting capabili-



SEEING NUMBERS: With its ability to graph complex equations, Mathcad 6.0 helps you visualize numbers and formulas.

ties, the existence of Unix-based TeX tools, and the fact that many scientists already prepare papers in TeX make it a formidable competitor for Mathcad.

Inside Mathcad, you'll find many new functions and an innovative programming language. The new language has *if*, *for*, and *while* loops, but since they can be used in recursive programs and arrays, the language can be quite powerful. For example, a sample program that's included defines an Anova function. Phrased in mathematical terms rather than programming terms, the language uses symbols to define functions, so that Mathcad displays a discontinuous function using a curly brace. Mathcad's language is less powerful than what you'll find in programs like Wolfram Research's Mathematica, but it is much easier to learn and use.

The help menu includes the ability to jump to an on-line Mathcad handbook called QuickSheets. This section includes more than 120 worked-out exam-

ples of graphing, function definition, and many other basic operations. A single button lets you import any of these examples into your current worksheet.

SEE IT HAPPEN

Mathcad's animation is not quite as powerful as that found in the symbolic math powerhouse programs. The advantage Mathcad does have over the competition, however, is that it saves the animation sequence in a standard .AVI format so that it can be easily distributed.

Other enhancements in Mathcad 6.0 include mail enabling over MAPI and VIM networks, links to Lotus Notes, and the ability to place live equations in text regions and have tear-off button palettes. There are three new graphing styles available (vector, 3-D bar, and 3-D scatter), and you can finally adjust a graph's line weight to enable the use of lines that are thicker than the skinny ones that have been standard in Mathcad for the last ten years.

The new program also includes the rudiments of image processing. Mathcad has a function that reads the bits of an image into a matrix that can then be filtered. There are additional statistical functions including an implementation of Loess data smoothing.

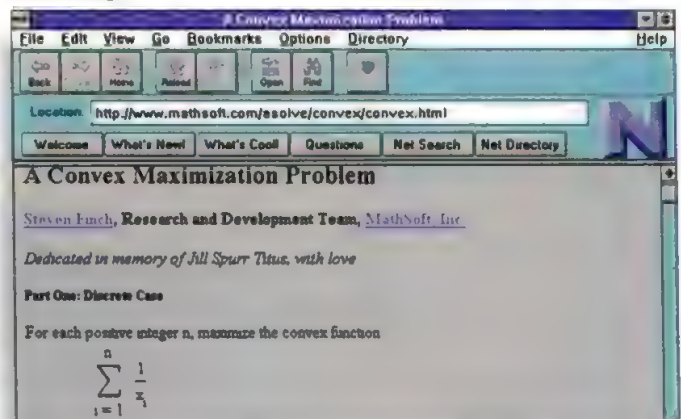
This is where the Standard and Plus editions of Mathcad diverge. The Standard version is missing some of the higher-end features of the Plus version, including the language capability, Loess smoothing, and image processing. While the standard program allows Web document authoring, you can't view Web documents.

Mathcad 6.0's biggest disappointment is its inability to run well under Windows 95. While everything went off without a hitch under Windows 3.1 testing, we found that under Windows 95, the system crashed when we tried to shift tabs in the property sheet for an x-y graph. Mathcad couldn't print to a Hewlett-Packard LaserJet 4 or send e-mail, and we were unable to either export a file we created as rich text format or to import a Word for Windows file. MathSoft has written a patch to address these shortcomings; it's available on the World-Wide Web at <http://www.mathsoft.com>.

If your mainstay is Windows 3.1, then this is an upgrade you'll want to have. It solidifies Mathcad's position as the math program of choice for those who don't need a high-end programming language.

Mathcad 6.0 List price: Standard Edition, \$129.95; Plus Edition, \$349.95. Requires: 4MB RAM (8MB for Plus Edition), 20MB hard disk space, Microsoft Windows 3.1 or later or Windows NT or Windows 95. MathSoft, Cambridge, MA; 800-628-4223; fax, 617-577-8829.

Circle 404 on reader service card



MATH ON THE WEB: Connecting to MathSoft's Web site enhances this Mathcad release with additional features.

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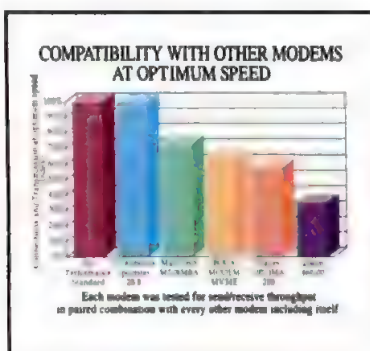
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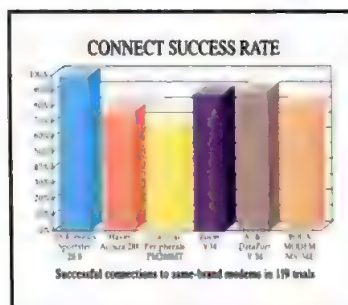
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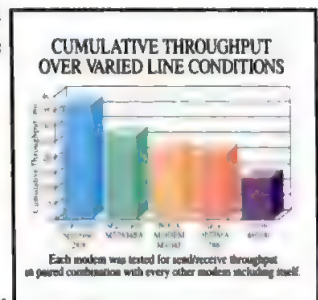
Any modem can enhance its connection success rate by reducing speed. So the labs compared the modems' success when connecting at optimum speeds over a spectrum of line conditions.

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SPORTSTER TOPS IN THROUGHPUT, TOO.

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VIDEO

MGA Millennium Speeds Up Graphics with Window RAM

By David A. Harvey

Matrox's new \$379 4MB MGA Millennium is an affordable graphics board that looks toward a 3-D and video future for PC users. The card is based on a 64-bit MGA-2064W graphics engine, includes on-board 3-D and video acceleration, and is outfitted with 4MB of Window RAM (WRAM). And it ships standard with a 220-MHz TI ViewPoint RAMDAC.

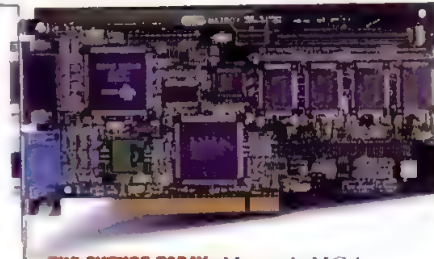
The Millennium can display up to a 120-Hz refresh rate at 1,024-by-768 resolution, and a 78-Hz rate at 1,600-by-1,200 resolution. Using packed-pixel mode, the Millennium will display a top resolution of 1,600-by-1,200 resolution with 65,536 colors; from 1,280-by-1,024 resolution on down, you get a photorealistic 16.7 million colors. The board also supports 32-bit color.

The Millennium's cutting-edge 3-D support uses an engine that accelerates Gouraud shading via texture mapping, double-buffering, and Z-buffering. Resolution is the limiting factor here: 3-D acceleration is only supported at 640-by-480 resolution with 16.7 million colors, and at 800-by-600 resolution with 65,536 colors.

With the Millennium's monitor-selection utility we were able to set our own monitor definition in either a basic or an advanced mode. A caveat: In advanced mode you can set the pixel clock faster than the RAMDAC, but we don't recommend using this feature because the PC may operate unreliably. On the whole, monitor support is a drawback. The board we tested supported fewer than 40 monitors; of those it did support, 13 selections were for generic multiscanning or VESA monitors. Sony monitors were conspicuously absent.

The Millennium's Windows 95 support delivers bare-bones graphics: Video and 3-D acceleration are missing, thanks to the delay of DirectDraw support in Windows 95. When you first install the Millennium under Windows 95, you quickly discover an excruciatingly low refresh rate. To sidestep this defi-

ciency, we suggest you use the Windows 3.1 monitor selection utility—but you'll have to do this every time you start up. Matrox



THE FUTURE TODAY: Matrox's MGA Millennium brings 3-D technology to today's video boards.

says that by the time you read this, the Windows 95 set of drivers should be more complete.

The Millennium's Windows 3.1 drivers support DCI and 3-D acceleration, as well as AutoCAD for DOS and Windows. A bonus CD-ROM is full of utilities, games, and applications that are designed to tap the board's high-end features.

This 4MB board turned in top-flight performance across a variety of benchmark tests. Particularly impressive was its Winstone 95

score of 106.0 at 1,024-by-768 resolution with 16.7 million colors on the same Pentium/90 test-bed that was used for our June 27, 1995, graphics-card roundup ("Ultrafast Graphics: The Professional's Choice"). Equipped with the same complement of memory, this score was bested only by the Diamond Stealth 64 Video VRAM card.

But an issue both for benchmark tests and real-world performance is Matrox's bitmap-caching feature, DevBits. Matrox's README file cautions, "When this feature is activated, Windows is not 100% reliable and could cause some applications to crash."

DevBits caches small bitmaps into unused portions of the card's graphics memory, which can speed the display of button bars and frequently accessed dialog boxes. On our Graphics WinMark 95 benchmark tests, DevBits caused the card's score to leap from 12 million to 16 million pixels per second at 1,024-by-768 resolution with 16.7 million colors.

In the real world, though, we found that DevBits offered no significant performance improvement. In fact, when we used DevBits on a 16MB true-color bitmap in PhotoShop, the feature actually slowed scrolling of the image noticeably. DevBits also caused other programs to crash.

Though Millennium may not be the fastest card around, it's top-notch and has some interesting performance enhancements. It easily ranks as one of the top graphics boards available.

MGA Millennium. List price: \$379. Requires: PCI slot. Matrox Graphics Inc., Dorval, Quebec, Canada; 800-361-1408, 514-969-6300; fax, 514-969-6363.

Circle 432 on reader service card

HARD DISKS

Seagate's Medalist Hard Disk Goes for the Gold

By Winn L. Rosch

Only 18 millimeters high, the \$340 Medalist 1080, from Seagate, fits tight 3.5-inch drive bays and even tighter budgets. By year-end, Seagate believes this Enhanced IDE drive will chop the street price of 1GB of data storage to below \$300. That adds up to less than 30 cents per MB.

The sharp pricing edge of the 1080 comes from honing Seagate's existing designs rather than from any breakthrough. Even so, the hard disk boasts impressive specs: a 1.08GB capacity by Seagate's optimistic count (we measured 1.03GB), an access time under 8 milliseconds, and a transfer rate peaking at 16.6 megabytes per second (MBps) using Mode 4 PIO.

Although the 1080 plugs into a standard IDE connector, taking advantage of its full capacity and performance requires extensive system support. You need Logi-

cal Block Addressing (LBA) to handle the drive's translation to 2,100 cylinders (16 heads, 63 sectors per track) for a capacity of more than 528MB without pro-



DATA ON DEMAND: Seagate's Medalist 1080 is an inexpensive 1GB storage solution.

prietary disk management software. Full speed requires a high-performance host adapter as well.

Using a VL-Bus IDE connection, the drive moved 100MB using DOS function calls at about 1 MBps. Kicking in all its perfor-

mance enhancements pushed that data-transfer rate to 2 MBps. Without DOS overhead, the 1080 can easily rival A/V drives in terms of its transfer rate (a sustained 3-MBps throughput). A 32-bit driver is available for the drive.

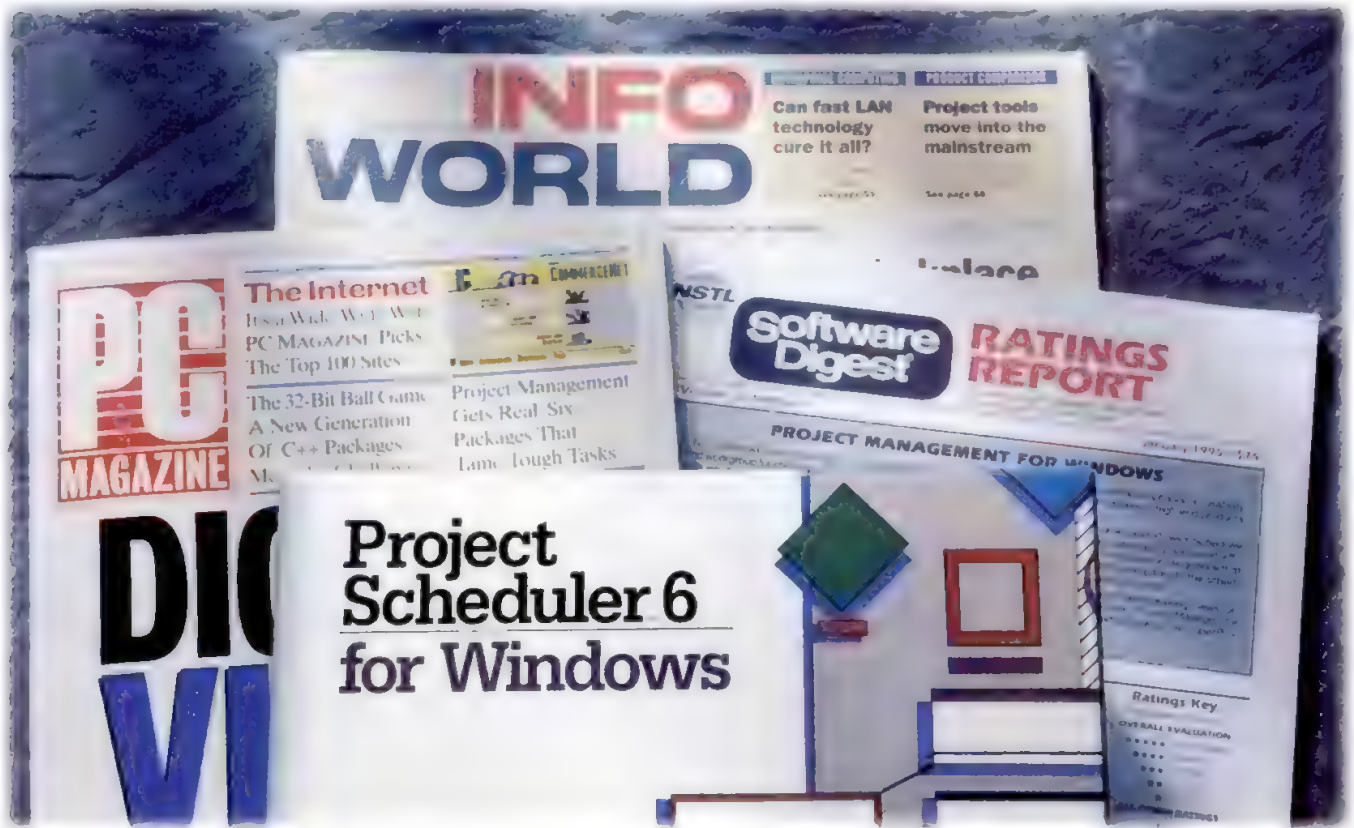
Several nice touches show that Seagate understands the consumer market. Jumper settings and BIOS parameters are fully documented on the drive. Operation is quiet; even during head accesses, the 1080A SL is hardly louder than the typical PC cooling fan.

The quick, low-cost Medalist 1080 will undoubtedly spearhead the move toward 1GB disk drives as standard data-storage equipment.

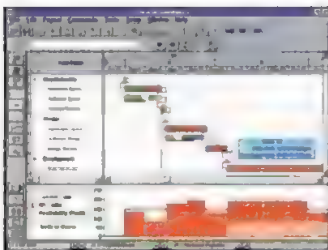
Medalist 1080. Estimated street price: \$340. Requires: ATA connector (Mode 4 PIO and LBA support recommended). Seagate Technology, Scotts Valley, CA; 408-438-8111; fax, 408-438-7852.

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OPTICAL STORAGE

PowerDrive²: Panasonic's Dual-Purpose CD-ROM Drive

By Alfred Poor

It looks like a CD-ROM drive. It reads data from CD-ROM disks and plays audio CDs. But slip in a new *phase-change dual-technology* (PD) cartridge from Panasonic and the new PowerDrive² is transformed into a 650MB removable-medium data-storage device. Available as an internal half-height device for a list price of \$895 or as an external device for \$995, the LF-1000AB PowerDrive² is more than a split-personality data drive—because this drive could change the way computer data (and other data) is stored and transmitted.

At the heart of the system is Panasonic's PD technology, which makes it possible to read and write data with a CD-like optical disk. Unlike magneto-optical (MO) drives, PD drives do not use a bias magnet. The drive stores data on a disk by using a laser that carefully melts the recording medium. Individual regions are melted so that they cool in either the crystalline state (which is more reflective) or an amorphous state (which is less reflective). A laser reads that information back to the computer.

A 650MB blank disk sells for \$59.95, or you can buy a six-pack for \$295. You can store as well as erase data on such disks repeatedly—as you can with a hard disk—making them attractive for data storage and archival use. By contrast, recordable CDs (CD-Rs) have similar capacity and cost only about \$10 per disk but can be written to only once.

HALF A MILLION CHANGES

According to Panasonic, the medium is good for at least 500,000 write cycles. The PD disks are a mix of optical and hard-disk technology. Like a CD-ROM, a PD disk spins at a constant angular velocity, which means that the disk turns faster as it gets to the inner tracks. The difference is that the data is arranged in concentric rings—as on a hard disk—instead of in a single spiral, as on a CD-ROM.

Throughput for read/write functions is rated at 1,141 kilobytes per second (KBps), which is faster than any CD-ROM drive. Likewise, the drive is rated at a 165-millisecond access time, which is faster than today's best CD-ROM units. Both specs, however, are still quite a bit lower than those of most hard disks.

The PowerDrive² would be an attractive removable storage device for backups and archiving alone, but the same drive can also read standard CD-ROMs, including audio CD and Photo-CD formats. It is a quad-speed data drive, rated at data-transfer rates of up to 600 kilobytes per second; the unit doesn't use a caddy for CDs.

During evaluation, we found that the drive was relatively easy to install. It is a SCSI-2 device, with DIP switches to set termination and the SCSI ID. It is designed to work with any adapter with ASPI support, and the package comes with CorelSCSI software that provides direct support for a large number of popular

signed two letters: one for CD-ROM functions and one for recordable PD disks. As a CD-ROM drive, it operates just as you would expect any quad-speed drive to work. On our tests, the drive managed 611 KBps sustained data throughput, which



OPTICAL ILLUSION: Panasonic's LF-1000AB PowerDrive² can read CD-ROM disks and record up to 650MB on an optical cartridge.

puts it among the best quad-speed CD-ROM drives available.

When the drive is operating as a CD-ROM drive, an indicator light on the front panel glows

quential data-transfer rate of 1,122 KBps.

EASY FORMAT

The PD disks come unformatted, but unlike the situation with other media such as streaming tape, formatting them is not a time-consuming ordeal. It took less than 7 seconds to format a disk for our tests using the CorelSCSI DOS or Windows utility that came with the drive. The included utilities also make it easy to configure and diagnose problems with the drive and the SCSI interface.

Panasonic has high hopes that the PD technology will make inroads into other areas. Not only does the company see PD playing a major role in data backup, archiving, and distribution, Panasonic also sees it filling a need in the home entertainment market. As digital video replaces existing analog television images, new media will be required to replace the familiar VHS videotape.

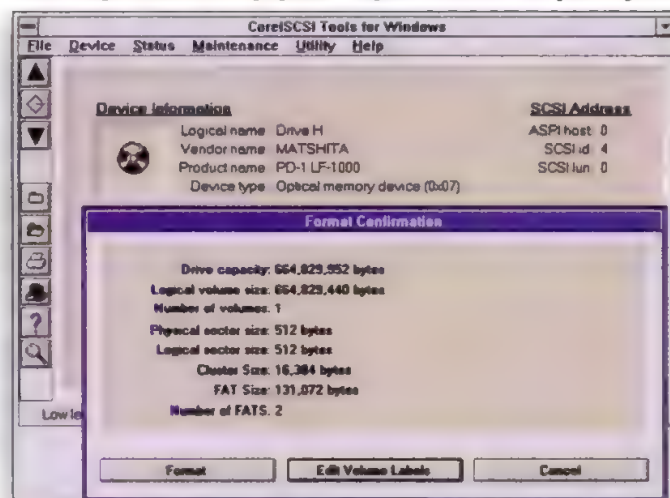
Panasonic plans to make PD technology a competitor for this market as well as for data storage. The upside is that a computerized family would need only one drive to play audio CDs, access data from computer CD-ROMs, and record and play digitized video programming. If the company is able to realize this goal, the prices for the drives and media will surely drop as production increases.

In the meantime, Panasonic's PowerDrive² is still an attractive alternative as a data storage system for the PC. For about the cost of separate CD-ROM and tape backup drives—and a lot less than the price of most MO and CD-R drives—you get a quad-speed CD-ROM drive, along with an optical data-storage system with decent speed and 650MB of space in each removable cartridge.

The LF-1000AB PowerDrive² is likely to solve a lot of storage problems for a lot of people.

LF-1000AB PowerDrive². List price: Internal model, \$895; external model, \$995. Panasonic Communications & Systems Co., Secaucus, NJ; 800-742-8086, 201-348-7000; fax, 201-392-4760.

Circle 403 on reader service card



QUICK START: The CorelSCSI Tools that are included with the PowerDrive² make it quick and easy to format and manage your disks.

controllers. The only potential installation problem is that the external drive uses the new high-density SCSI connector; finding the right cable may take some searching.

Under DOS, the drive is as

green. When you take out the CD-ROM and insert a PD disk (which comes in a sealed case the size of a CD-ROM caddy), the same indicator glows maroon. Using the Adaptec SCSI Bench



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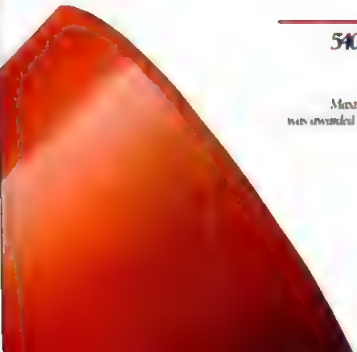
1.2GB

1.6GB

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- Complete Windows 95 compatibility
- Free three-year limited warranty for parts and labor²

from

\$1,639*



*In Canada, call 1-800-877-8567. **Average U.S. street price. Monitor not included. Source: iFJD Power and Associates Desktop PC Customer Satisfaction Study. ** Study conducted among business owners. Second and third year return to dealer. MS-DOS is a U.S. registered trademark and Windows is a U.S. trademark of Microsoft Corporation. Pentium and the Intel Inside logo are U.S. registered trademarks.

The ultimate PC for advanced business and technical applications.

HP Vectra XU

- Intel 75, 90, 120 and 133 MHz Pentium processors
- Supports dual processing with secondary processor socket
- 256 or 512KB second level asynchronous or burst synchronous write-back cache
- PCI architecture
- Four mass storage shelves (three front accessible), five expansion slots
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- 540MB,* high-performance Enhanced-IDE hard drive
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- Integrated 64-bit PCI, S3 Vision-964 graphics with 1280 x 1024 resolution or Matrox Impression Plus graphics with up to 1600 x 1200 resolution
- 8 or 16MB of RAM standard, expandable to 256MB
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- Free three-year limited warranty for parts and labor¹

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HP PCs

Compaq is touting theirs.

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their prices.

You may also wonder what Compaq means by 'network-ready.' For instance, are their PCs easiest to set up in multivendor networks? Is their management solution industry-standard – and can it manage all brands of PCs, not just their own? Are all management features available under Windows 3.1? Are they free? In HP's case, the answers are all yes.

In addition, HP ranked best overall among desktop PC business users in the 1994 J.D. Power and Associates Customer Satisfaction Study.¹

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users and based on 1,250 user respondents. *Other capacities available. All HP Vectra PCs come with MS-DOS 6.22 and MS Windows for Workgroups 3.11 preinstalled. HP mouse and keyboard. First year, on-site 24-hour service. trademarks of Intel Corporation. © 1995 Hewlett-Packard Company. P196122

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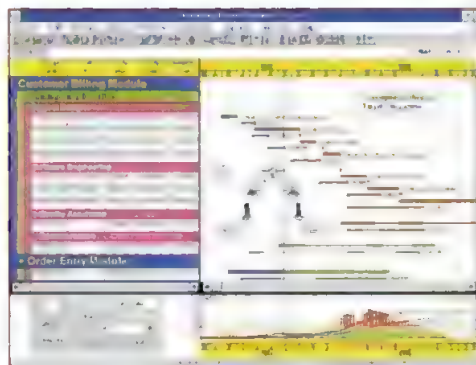
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New & Improved

NEWS OF ANNOUNCED PRODUCTS AND UPGRADES

By Melissa J. Perenson

HP's Bright Horizon

If you're looking for a notebook that doesn't require a trade-off between weight and functionality, look no further than **Hewlett-Packard Co.'s HP OmniBook 600CT**. Priced at \$3,400, this full-featured portable PC packs a powerful punch, yet weighs a mere 3.8 pounds. The 600CT includes a



HAVE NOTEBOOK, WILL TRAVEL: The HP OmniBook 600CT weighs in at just 3.8 pounds.

9.5-inch active-matrix display, a 486 DX4/75 CPU, 8MB of RAM, and a 260MB PC Card hard disk. There's also 16-bit integrated sound, a Type III PC Card slot, serial and parallel ports, an external floppy disk drive, and an IRDA-compatible infrared port. The 600CT uses a lithium ion battery and comes with HP's three-year warranty.

HP OmniBook 600CT. List price: \$3,400. Hewlett-Packard Co., Corvallis, OR; 800-443-1234.

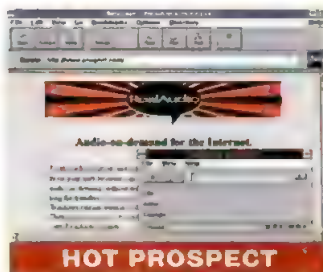
Circle 409 on reader service card

Search the Net Off-Line

If you're less than thrilled with the time it takes to conduct an on-line Internet database search, try **Frontier Technologies' \$14.95 CyberSearch for Windows**. This CD-ROM integrates Frontier's SuperHighway Access Internet browser with Carnegie Mellon University's vast Lycos catalog of Internet resources, making it easy to search the Internet off-line. CyberSearch will be produced monthly (bi-monthly initially), and subscriptions will cost \$6.95. The software works over both an Internet dial-up connection and a TCP/IP LAN connection.

CyberSearch for Windows. List price: \$14.95. Frontier Technologies, Mequon, WI; 800-879-0075, 414-571-0190; Web, <http://www.frontiertech.com>.

Circle 410 on reader service card



A New Player Enters the World Of On-Line Audio

If you're a frequent World-Wide Web surfer, chances are you're familiar with the interminable delays while waiting for a .WAV audio file to load before you can hear the sound clip. **Progressive Networks** is changing all that with RealAudio, a new way of delivering real-time audio over the Internet that's rapidly becoming a de facto standard. RealAudio is supported by most popular commercial and shareware browsers, including CompuServe's AIR Mosaic, Microsoft Internet Explorer, Netscape Navigator, and Quarterdeck Mosaic.

There are three components to RealAudio. The RealAudio Player offers users flexible playback controls, including a replay feature that lets you repeat a selection and a loss-correction capability that compensates for portions lost in the transfer. An intellectual property-friendly feature gives you information on the title, author, and copyright status of a clip.

The forthcoming RealAudio Studio will offer a complete editor-and-encoder software package that lets you compress common digital audio formats and convert them to the RealAudio Format for use with the RealAudio Player or for delivery over the Internet via the RealAudio Server. ABC, CBS, ESPN, MCI, and NPR are among the many Web sites already using RealAudio. To download a free copy of RealAudio Player 1.0, visit Progressive Networks' Web site at <http://www.realaudio.com/>.

RealAudio Player 1.0. List price: Available free of charge at <http://www.realaudio.com/>. Progressive Networks, Seattle, WA; 206-447-0567; e-mail, info@prognat.com.

Circle 408 on reader service card

Express Yourself Through Your Business Cards

Tired of having banal-looking business cards that don't stand out in the crowd? Try **Claris Corp.'s \$39 Easy Business Cards for Windows**. This affordable package empowers small businesses and individuals with the tools to create vivid, professional-quality business cards with ease. You can select from over 290 predesigned styles (many of which support PaperDirect's business-card stock) or edit the templates to add your own personalized touch. A clip-art library is included, although you can also import images.

Easy Business Cards for Windows. List price: \$39. Claris Corp., Santa Clara, CA; 800-544-8544, 408-987-7000.

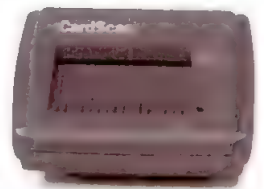
Circle 411 on reader service card

CardScan Plus: Is It Time To Replace Your Rolodex?

Corex Technologies Corp.'s \$299 CardScan Plus offers a software and hardware solution for importing business-card information into your PC. The enhanced CardScan Plus now has a parallel port for easy connection to laptops and desktop PCs. The 400-dot-per-inch gray-scale scanner automatically sorts the data found on a business card and inserts it into the included CardScan software. Although the Caere Omni-Page Pro optical character recognition engine offers improved accuracy, a bitmapped image of the card is retained as well. The upgraded software now supports DDE, and as a result also benefits from better integration with popular personal information managers and e-mail software, including such DDE-compliant packages as ACT, Delrina WinFax Pro, and Ecco. The CardScan software is itself a useful standalone PIM that works with most Twain-compliant scanners. Available separately for \$99, the software features a powerful search engine, an auto-dialer, and mail merge.

CardScan Plus. List price: \$299. Corex Technologies Corp., Brookline, MA; 800-942-6739, 617-277-5344; fax, 617-277-5069.

Circle 412 on reader service card



SCANNER UP: Virtual business cards.

A Real Anchor for the Web

Anyone who's had to create hypertext links for a World-Wide Web home page knows how tedious it can be to manually insert HTML tags. **Iconvex Corp.**'s \$895 AnchorPage offers relief from such manual labor by automating the process of inserting hypertext tags into a World-Wide Web database. The program goes a step further to provide a concept-based approach to creating the links. AnchorPage will make a conceptual analysis of text documents and create up to four synopses (concept, abstract page, phrase page, and table of contents). Any of the entries therein will become hot words linked to the segments of the original documents. This lets users easily scan the AnchorPage-indexed Web site for relevant information.

AnchorPage. List price: \$895. **Iconvex Corp.**, Bloomington, MN; 800-943-0292, 612-896-5100; fax, 612-896-5101.

Circle 413 on reader service card

Nostalgic Clip Art

Step into a time warp with **Image Club Graphics's** \$99 Neo Retro Volume 34. The latest installment in Image Club's DigitArt series of clip art, Neo



NEO RETRO: A blast from the past.

Retro revisits the postwar era by offering cultural icons as powerful as they are sentimental. There are over 150 encapsulated PostScript images divided into six categories, including heroes, leisure time, and technotronic. These classic images inimitably capture

the times they represent.

Neo Retro Volume 34. List price: \$99. **Image Club Graphics Inc.**, Calgary, Alberta, Canada; 800-661-9410; fax, 403-261-7013.

Circle 414 on reader service card

For Your Eyes Only

Security over the Internet is a common concern for corporate and individual Internet users. One approach to e-mail security is **Scrambler Technologies'** \$69.95 Scrambler for Windows. Scrambler uses the Data Encryption Standard, which is based on the private-key encryption method that requires both the sender and the recipient to know a common keyword in order to scramble and unscramble a message. Featuring an easy-to-use interface, Scrambler works with many popular word processing and e-mail systems, including Microsoft Mail, Microsoft Word, and WordPerfect. You can visit their World-Wide Web site at <http://www.scrambler.com/scrambler>.

Scrambler for Windows. List price: \$69.95. **Scrambler Technologies Inc.**, Loveland, CO; 800-834-4005, 970-346-4066; fax, 970-346-4033.

Circle 419 on reader service card

HARDWARE BRIEFS

Motion-JPEG, the accepted intraframe video compression standard, is the basis of **Quadrant International's** new line of Q-Motion 100 boards. These cards are capable of video capture and playback at 30 frames per second (fps) for NTSC and 25 fps for PAL, at 640-by-480 resolution. When connected to a Quadrant VGA card (which the company says will be available by the end of this year), you'll be able to preview full-screen video directly on your monitor, thanks to the Q-Motion 100's proprietary interface, which provides a direct conduit to the video data stream. 800-700-0362, 610-964-7600.

Panasonic Personal Computer Co. has released a \$4,099 enhanced version of its V41 MKII notebook with integrated CD-ROM drive. The new unit has a 90-MHz Pentium CPU; a high-contrast, nonglare, 10.4-inch active-matrix display; a 1GB hard disk; and a nickel hydride battery. The real news here, though, is that there's an MPEG option for full-screen, full-motion, 30-frames-per-second video playback with 262,000 colors. The \$649 MPEG module, which can be swapped with the battery, allows playback of MPEG-1 and Video CD files. 800-662-3537, 201-271-3182; fax, 201-392-6618.

If you already own a Panasonic V41 series multimedia notebook and need to add more memory, **Simple Technology** is offering a 32MB proprietary memory module to upgrade the V41 to 48MB; previously, the maximum RAM capacity was 32MB. The module, which has been tested by Panasonic, costs \$1,850. Simple also offers 4MB, 8MB, and 16MB RAM upgrades for the notebook. 800-367-7330, 714-476-1180; fax, 714-476-1209.

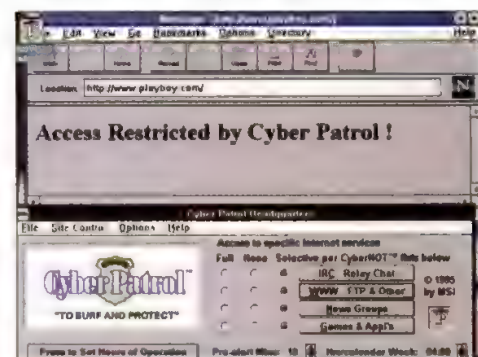
Ready to start your own World-Wide Web site? To help get you started, **ACT Corp.** offers a complete Web-server package. The \$2,995 Web*Star Server features a 75-MHz Pentium CPU, 16MB of RAM, a 540MB hard disk, Netscape Navigator, HTML script-authoring software, a Web-site communications server, and Microsoft Windows NT. 800-523-4228.

Advanced Logic Research has brought the list price of its basic slimline desktop Pentium PC to a new low. The ALR Optima SL 575 Model 540B is not a multimedia machine filled with all the usual bells and whistles, but you can pick one up for just \$1,249—a 75-MHz Pentium CPU, 8MB of RAM, and a 540MB IDE hard disk are all included. 800-444-4257, 714-581-6770.

It's 10 P.M.: Do You Know Where Your Children Are?

It used to be that if your kids were holed up in the den with their eyes glued to the tube, then yes, you did indeed know where they were. But with the advent of the Internet, parents have no way of knowing whether their child has wandered onto the wrong side of cyberspace or is simply viewing Peanuts cartoons.

Microsystems Software's \$49.95 Cyber Patrol is one of the best solutions around for keeping tabs on your child's on-line activities. Cyber Patrol gives adults the ability to restrict their child's access to inappropriate material on the Internet and also lets them monitor a child's on-line and other application usage. The program uses a researched listing of questionable Internet sites to automatically block access, and you can customize the list at any time. Adults have unre-



NO ENTRY: Cyber Patrol effectively blocks access to the seamier neighborhoods in cyberspace.

stricted access via a password. Weekly updates can be downloaded automatically through the software, which includes a 6-month subscription. Subsequent 6-month subscriptions cost \$19.95. A trial version of Cyber Patrol is available at Microsystems' Web site (<http://www.microsys.com>).

Solid Oak Software's \$39.95 CyberSitter takes a different approach. It monitors computer activity and keeps a log of where a user has been so you can keep track of who's accessing what files, either on-line or on your local system. When a child tries to download or view improper images, you can block the image from loading. You can also lock a child out of files or programs on your hard disk, floppy disk, and CD-ROMs.

Cyber Patrol. List price: \$49.95. **Microsystems Software Inc.**, Framingham, MA; 800-828-2608, 508-879-9000; e-mail, cyberinf@microsys.com.

Circle 417 on reader service card

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You can download a trial version of CyberSitter from Library 4 of the Editorial forum on ZiffNet. Type GO EDITOR from any CompuServe I prompt.

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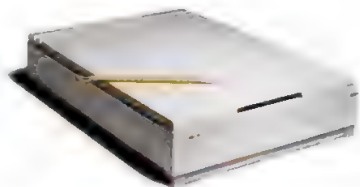
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The Canon Color Scanner. that's *really* just an



The Canon IX-4015 is the smallest flatbed color scanner there is. But even though it can fit in a small

cubbyhole, it will open up a world of possibilities for you.

At the click of the Autoscan button, you'll be able to scan in artwork, a photo or a line drawing. And easily give all your fliers, brochures, even family projects,

that professionally polished look.

The OFOTO® 2.0 software does all the hard stuff--cropping, straightening and sharpening the image--while Caere's OmniPage® Direct OCR software scans your documents right into your word



Perfect for the corner office office in the corner.



*Project a
worldly
professional
image. Or just
have fun with
the family.*

processor, just as if you typed them yourself. (FYI, the Canon IX-4015 can double as a color copier.)

You'll also be happy to know, the Canon IX-4015 comes with a two-year limited warranty, as well as a price tag that fits nicely

in even the tightest family budget!

For more information on the Canon IX-4015 scanner, just give us a call at 1-800-848-4123, Ext. 111. Remember, we're in your corner.

Canon

CyberSitter for Windows. List price: \$39.95. Solid Oak Software Inc., Santa Barbara, CA; 800-388-2761, 805-967-9853; fax, 805-967-1614.
Circle 418 on reader service card

Bring Your PC Alive with The Sound of Music

Bundled budget speakers may be the most disappointing component of your new multimedia system. But for \$119.99, **Labtec's** LCS-3210 speakers promise to deliver the full-sounding audio that usually eludes a single pair of speakers. That's because the LCS-3210 models incorporate Desper Products's Spatializer Audio Processor, an



SOUND TOWER:
Labtec's new LCS-3210 speakers.

audio-processing technology that provides three-dimensional surround sound without any additional components. The LCS-3210 speakers also include Transmission Line technology to generate powerful bass without the aid of a subwoofer.

If you're willing to invest a little more in your PC sound system, but don't want to scrap your existing

speakers, consider the SoundWorks Powered Subwoofer, from **Cambridge SoundWorks**. Identical to the subwoofer found in Cambridge's complete SoundWorks system, this \$149.99 subwoofer box adds the deep bass sound that's missing from most speaker systems that come bundled with multimedia computers. The subwoofer uses a Y-connector to share the audio output from the computer with your standard speakers.



COMPACT BASS:
The SoundWorks Powered Subwoofer.

Labtec LCS-3210. List price: \$119.99. Labtec Enterprises Inc., Vancouver, WA; 360-896-2000; fax, 360-896-2020.

Circle 415 on reader service card

SoundWorks Powered Subwoofer. List price: \$149.99. Cambridge SoundWorks Inc., Newton, MA; 800-367-4434, 617-332-5936; fax, 617-332-9229.

Circle 416 on reader service card

MPEG for the Masses?

That's what **Alaris's** \$199 Matinee seems to have in mind. A combination PCI multimedia graphics accelerator and video accelerator, Matinee supports scalable full-motion video playback at

SOFTWARE BRIEFS

Time is money, especially if your livelihood is based on billable hours. **Responsive Software's** \$79 Responsive Time Logger, Version 2.0, is a valuable tool for keeping track of your time. The new version features improved integration with other applications and lets you store Time Logger data as dBASE files. Invoices can be designed in Ami Pro, Word, or WordPerfect word processors; quote-delimited import/export filters and a Quicken-compatible interface have also been added. 800-669-4611, 510-843-1034.

If you're on the clock and on the road, **Carpe Diem Mobile** for Windows (CD-Mobile), from **ProSoft**, is tailor-made for you. CD-Mobile is an add-on that works with ProSoft's other Carpe Diem time-tracking products. Designed with road warriors in mind, CD-Mobile lets you use a modem to synchronize time and expense data between the notebook you take with you and the networked PC back your desk. 800-477-6763, 214-386-7769.

Ever get yourself into a panic after hitting the wrong button while using Windows? Well, **Camira Technologies' The Panic! Button** should help ease your frenzy. And now there's an update to the program that goes a step beyond the program's original mission of helping you restore your desktop to its former condition. The new \$44.95 Network Version enables system administrators to restore desktops through the setup of global Program Manager data files. 815-455-8066.

So you need to use Unix on your PC? **WorkGroup Solutions** has released Linux Pro, Version 2.2, a \$19.98 full-featured Unix operating system clone for 386 PCs or better. This CD-ROM includes the necessary drivers for sound cards, CD-ROMs, video cards, IDE interfaces, and SCSI host adapters. There's also support for newer hardware products like PCI bus-compatible expansion cards. The Compendium version includes four CD-ROMs and a 1,200-page manual for \$69. 303-699-7470; fax, 303-699-2793.

Get rid of those nasty viruses that threaten to crash your machine with **F-PROT Professional 2.18**, from **Command Software Systems**. A DOS and Windows program in one, the \$170 package includes an antivirus virtual-device driver that works in the background and a powerful Microsoft Windows NT rescue utility. It also scans for over 6,000 viruses. Several new features are network administrator-friendly. 800-423-9147, 407-575-3200.

up to 30 frames per second, as well as most of the popular video playback codecs, including Cinepak, Indeo, MPEG-1, and Video for Windows. Alaris achieves this one-card solution by coupling Alliance Semiconductor's ProMotion 6410 graphics/video accelerator chip with Xing Technology's XingMPEG Player Plus software. Through October 31, 1995, a full-length MPEG feature film is bundled with the card.

Matinee. List price: With 1MB VRAM, \$199; with 2MB VRAM, \$299. Alaris Inc., Fremont, CA; 800-317-2348, 510-770-5700; fax, 510-770-5769.
Circle 420 on reader service card

One-Stop Internet Kit

If you've been surfing the World-Wide Web for any length of time, chances are you've already gotten itchy to add your own page to the net. **The Coriolis Group's** \$79.99 All-in-One Web Surfing & Publishing Kit provides all the tools you need for creating your own Web pages. The package's CD-ROM includes NetSeeker, which lets you search the Internet for updates to Web browsers and publishing resources; Web Spinner, an enhanced version of a shareware HTML editor; and HomePage Creator, which guides you through the process of creating pages for the Web. If you don't already have an Internet connection, you'll need NetManage's included Automatic Internet, which will help get you on your way to publishing on the Web. You also get three books from The Coriolis Group: *Netscape & HTML Explorer*, *Web Explorer Pocket Companion*, and *Free Stuff From the World Wide Web*.

All-in-One Web Surfing & Publishing Kit. List price: \$79.99. The Coriolis Group, Scottsdale, AZ; 800-410-0192, 602-483-0192; fax, 602-483-0193.
Circle 421 on reader service card

A Radical RAD Tool

TopSpeed Corp.'s Rapid Application Development (RAD) tool, Clarion for Windows 1.5, is essentially the developers' equivalent to a Chinese restaurant's mix-and-match-style dinner menu. Clarion uses the Fourth Generation Language to allow developers to assemble an application using two-way visual programming tools and pre-coded templates that require less training than C++. Standards supported include DDE, ODBC, and Visual Basic Custom Control Libraries (.VBX controls). TopSpeed will offer a 32-bit compiler that lets you quickly recompile 16-bit applications to run as 32-bit applications under Microsoft's Windows 95 or Windows NT. **Clarion for Windows 1.5.** List price: \$1,299 (introductory price through December 31, 1995, \$499); upgrade, \$199. TopSpeed Corp., Pompano Beach, FL; 800-354-5444, 305-785-4555; fax, 305-946-1650.

Circle 422 on reader service card



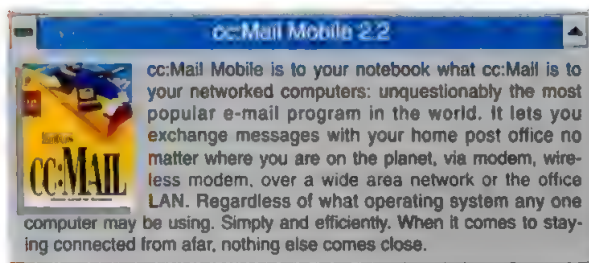
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preferred by
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And heaven
knows they've
had time to
think about it.

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With cc:Mail Mobile on your notebook computer, you can connect by modem, wireless modem, over a wide area network or the office LAN. And send messages, receive them, even access up-to-the-minute information through Bulletin Boards. And with over 150 new File Viewers, you can view files regardless of which application they were created on.

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Either way, get started today for just \$99.

NaviServer is yours to try for 60 days. The \$99 includes a CD-ROM, full documentation and technical support, and a free copy of NaviPress. Plus, the \$99 goes toward the price if you decide to buy your own server. (Windows NT: \$1,495. UNIX: \$4,995. MSRP)

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CIRCLE 327 ON READER SERVICE CARD

Read Only

REVIEWS OF THE LATEST BOOKS FOR THE PC USER

Edited by Tin Albano

Windows 95 for Dummies Is Smart Reading

BY EDWARD MENDELSON

Windows 95 for Dummies, like most books in the...*for Dummies* series, is really a book for anyone who wants to become an expert and be entertained in the process. Although this hands-on survey is based on the preview version of Microsoft Windows 95 released in the spring of 1995, it's accurate and detailed enough to serve as a complete guide to the shipping version. A few other details have changed since the preview version, but not enough to cause any problems if you use this book instead of Microsoft's manual.

Andy Rathbone writes lucidly and wittily, but the jokes never get in the way of the information. The book opens with a standard tour of the Windows screen but moves quickly to the parts of Windows that you'll enjoy fiddling with. Thirty pages on the Control Panel cover most customization options. Many short sections include information seldom found in other sources.

Windows 95 "scraps"—text or graphics that you drag from applications and store on the desktop as OLE (Object Linking and Embedding) objects—aren't mentioned in most previews of Windows 95 but are covered in full here. Rathbone knows that programs freeze, and he tells you how to recover the rest of a Windows session when they do. The book's scope is limited to home and small-office users, so you won't find anything about networks or Internet connections. If you want to learn about REG-EDIT and other advanced tools, look elsewhere.

Some of the tips are highly useful, including some left over from Windows 3.1 that you may never have known about. One tip explains how to paste text from the Windows clipboard to graphic-based DOS programs that can't run in a window. (You minimize the DOS application, then use Edit and Paste from the minimized icon's right-click menu.)

Another tip notes that you can "lasso" icons in an Explorer or My Computer window. You may have read elsewhere that you can't format floppy disks in Windows 95; Rathbone tells you how to get the job done from the icons in My Computer or Explorer. He warns you that Windows 95's shortcuts lose all contact with their targets if you rename or move the target file.

A few details seem left over from a book about Windows 3.1.

For example, Ctrl-Esc doesn't bring up the task list in Windows 95 as it did in previous versions.

In fact, the old-style task list appears only when you run TASKMAN.EXE. But virtually every other detail is accurate and illuminating, and the style is often hilarious.

Windows 95 for Dummies, by Andy Rathbone, \$19.99. IDG Books, 800-762-2974; ISBN: 1-56884-240-6.

Circle 460 on reader service card



Desktop Publishing for Beginners

BY DANIEL GROTTA AND SALLY WIENER GROTTA

Though the title doesn't indicate it, *The Ultimate Desktop Publishing Starter Kit* isn't a general overview of entry-level desktop publishing. The only things you'll learn about Adobe Photoshop, Aldus PageMaker, and other major DTP programs are in the appendix's resource guide and features-comparison chart. Rather, this is a supplemental introduction to Serif's \$99 DTP-lite program PagePlus 3.0. It even comes with a CD-ROM containing a full working version of this popular program (which expires in 60 days) as well as a 10-

minute tutorial, hands-on lessons in creating various projects, and a clip-art collection.

As a PagePlus 3.0 guide, *The Ultimate Desktop Publishing Starter Kit* pretty much touches on all the basics. The writing is conversational, and by working through the CD-ROM projects, the reader can easily get a leg up on the learning curve.

Some of the book's advice, however, is ambiguous or incomplete. For example, we're told that files to be sent to a service bureau for printing should be saved to a floppy disk; there's not a word about using removable storage such as SyQuest or magneto-optical cartridges for

files larger than 1.44MB. Photo CDs are discouraged as an input method because they're expensive, but nothing is said about their image superiority to desktop flatbed scans. And while there's a discussion of mice and trackballs, the author neglects to mention drawing tablets.

The book's worst failing is that much of its hardware advice is 12 to 18 months out of date, which in the DTP time frame is half a lifetime. We read about double-speed SCSI CD-ROM drives, 60-MHz Pentiums, VESA graphics boards, and 300-dot-per-inch scanners. In fact, the appendix actually lists seven mice and five keyboard manufacturers, when virtually every PC sold today comes with both kinds of tools.

There is one compelling reason to buy this book: Owners can upgrade to a full-blown version of PagePlus for \$39, which is cheaper than the retail price.

The Ultimate Desktop Publishing Starter Kit, by Anne Fisher Lent, \$29.95. Addison-Wesley Publishing, 617-944-3700; ISBN: 0-201-41032-X.

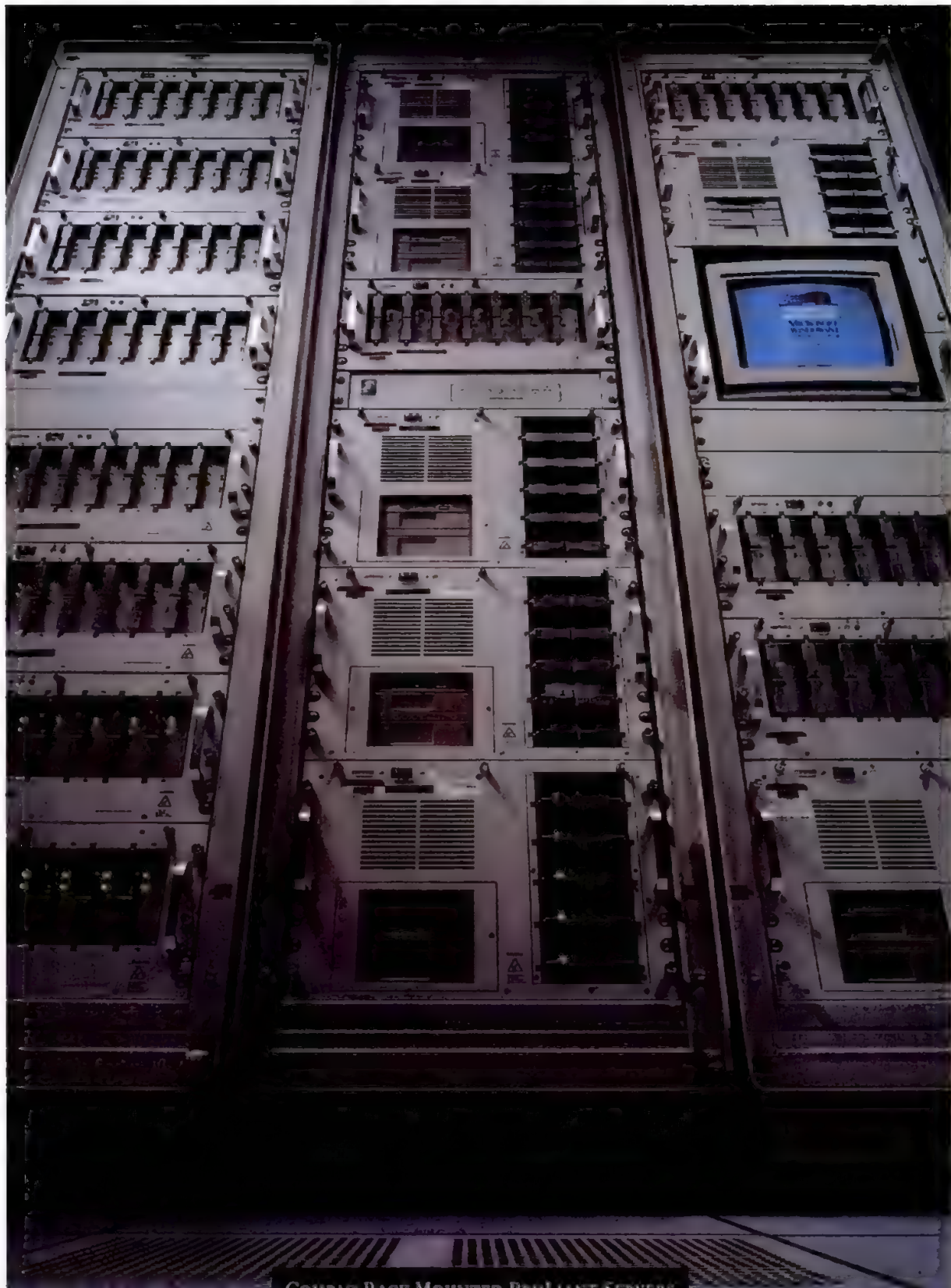
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Software developers who want to create new Microsoft Windows applications for foreign countries should consider picking up *Developing International Software for Windows 95 or Windows NT*, an informative tome by Nadine Kano. \$35; Microsoft Press, 800-677-7377; ISBN: 1-55615-840-8.



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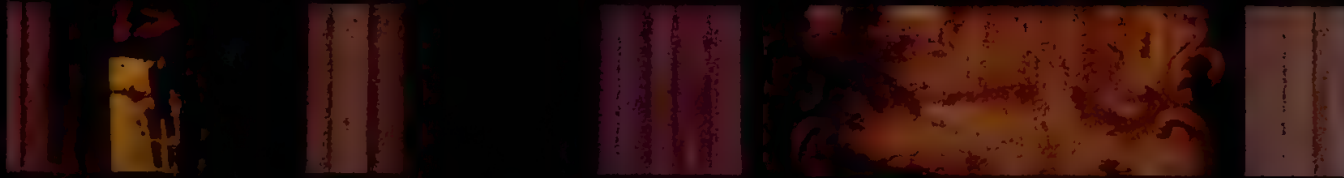
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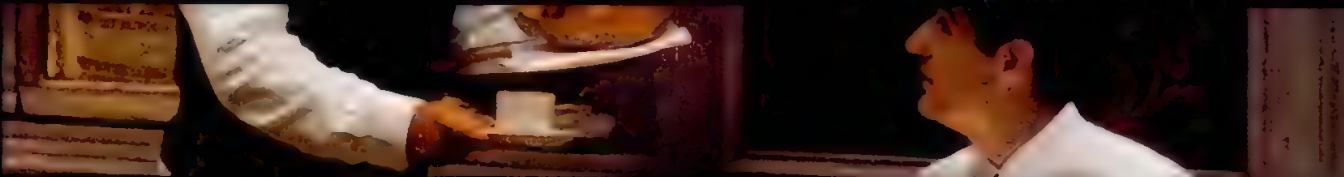
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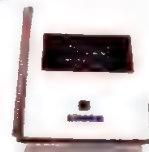
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Michael J. Miller

Cybersex Shock

What did you say? There's sex on the Internet!? Tell me it isn't so! How'd it get *there*? Quick, someone pass a law so we can get rid of it. . . . Okay, everyone, calm down, take a deep breath, and repeat after me: There is sex on the Net, there is sex

on TV, there is sex in books and magazines, and there is most definitely sex on the silver screen. Everywhere we turn there is sex. It's not a disease, some hot form of Ebola spreading uncontrollably through every type of media. Sex is a reality of life.

Sex also sells. That's why our politicians and the general press have focused so much attention on sex on the Internet. Look at Senator James Exon's silly Decency Act; it got more attention than the rest of the recent telecommunications bills passed by both the House of Representatives and the Senate.

For the most part, I agree with those who look at our representatives, shake their heads, and say, "They just don't get it." Singling out electronic communications and the Internet is silly given the content of many of today's movies, television shows, records, and books. Besides, we have to remember that the Internet is an international network, and no one can screen all the information out there or impose U.S. law abroad.

If you want to see just how out of touch our elected officials are, let's look at the rest of the new telecommunications bill and its underlying fallacies.

The belief that on-line communications are analogous to broadcast communications. This is implicit in nearly all of the attempts to regulate on-line services and the Internet. About the only thing that the Internet has in common with broadcast services is that it uses electricity. Broadcast television and radio both use a theoretically limited public resource transmitting on certain bandwidths. This is the reasoning behind such things as the Federal Communications Commission and its activities, such as the Fairness Doctrine. The

same reasoning shouldn't apply to the Internet, or indeed to on-line services, where there are no limits to the number of sites with information.

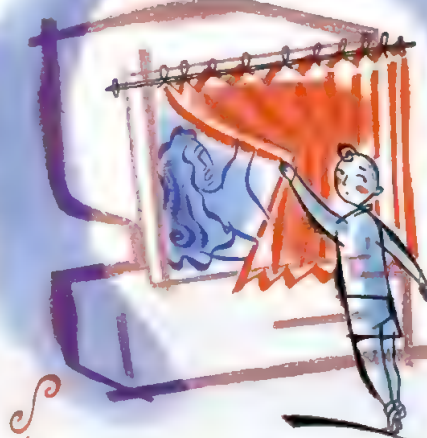
Unlike broadcast media, on the Internet you don't typically stumble upon something you don't want to see unless you're looking for it. Typically, you have to enter a specific address or follow a link to end up at a particular place on the Internet. The Internet is much more like going into a bookstore and choosing to look at adult magazines.

The focus on controlling regulation for yesterday's technology. The great bulk of the new rules are designed to ensure more competition for telephone services and perhaps for cable television. We all want more competition, but I wonder whether these new rules just set up new regulations when the marketplace already suffices.

More important, I see no indication that things such as telephone services offered via the Internet, video delivery via computer, direct-broadcast satellite, or even two-way cable are part of these grand regulations. I'm just not sure whether the new regulations will get in their way or whether we're better off keeping the government out.

The focus on the U.S. role. Somehow, our government seems to have forgotten that the Internet, like the World-Wide Web, is worldwide. While U.S. government agencies did sponsor much of the original work for setting up the predecessors to the Internet, many of its innovations came from other countries. In fact, even the Web itself was developed by CERN in Switzerland.

In arguing for regulations, and limits on contents, our politicians ignore the reality that much of the content on the Internet



It's our responsibility—not the government's—to protect our children from the Internet's seamy side.

Michael J. Miller

comes from overseas and that there's no clear boundary between information published in the United States and information published abroad. Even if our government tried to regulate the Internet, the very nature of electronic communications makes it impossible to set up barriers among connected computers.

Already, we're beginning to hear complaints about the English-centric nature of the Internet. More U.S. regulations will only increase such complaints.

One philosophy espoused frequently on the Internet is that any restriction on electronic conversation is inherently bad. I disagree. As a society, it's our right and our responsibility to monitor what material is readily available to our children, and frankly, we've done a pretty poor job.

I applaud some of the efforts being made to create a "family-safe" on-line experience. America Online and Prodigy are working to create family-friendly services, and others, including our sister publication *FamilyPC*,

are trying to sort through the Internet and create a directory of family-friendly Web sites. Some people are working on technical solutions, creating software that limits access to computers, the Internet, or specific parts of the electronic world.

Much attention has focused on Surfwatch, a program that automatically blocks access to 1,000 sites and lets you screen newsgroups, Web sites, FTP locations, and other electronic avenues. At \$49.95 plus a \$5.95 monthly subscription, it's a bit pricey, but expect to see other software developers adopt similar technologies in the very near future.

Other software-screening alternatives include Microsystems Software's CyberPatrol, which offers controls similar to Surfwatch, and NetNanny, which lets parents or guardians monitor everything that passes through the computer. In case you're worried about the amount of time your kids are spending on-line, Fresh Software Co. has a program called Time's Up, which lets parents set time limits or set acceptable hours for use of on-line services. CyberPatrol has the same feature.

Experience tells us that no system is fool-proof and that kids can find their way around

these restrictions. That's representative of the real world. Like it or not, our children will be exposed to sex and violence in all forms of media. We need to teach them how to handle it.

While technological solutions have some merit in that they do let parents set limits on what their children watch, none of them can effectively take the place of an involved parent. We all need to sit down with our kids and pay attention to what they watch, what they listen to, and where they go on-line. They may not always do what we want them to do, but we owe it to them to teach them what is appropriate behavior. For instance, if your kids use on-line services and "chat" rooms, you must teach them to remember that the people in these rooms are strangers, and they shouldn't give out their real names or addresses. It's just like the real world.

When it comes to our children, censorship is a far less important issue than good parenting. We must teach our kids that the Internet is an extension and a reflection of the real world, and we have to show them how to enjoy the good things and avoid the bad things. This isn't the government's responsibility. It's ours. □

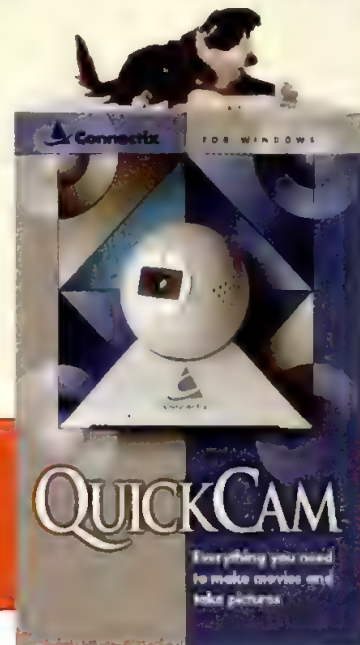
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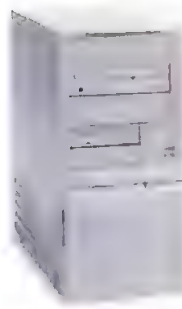
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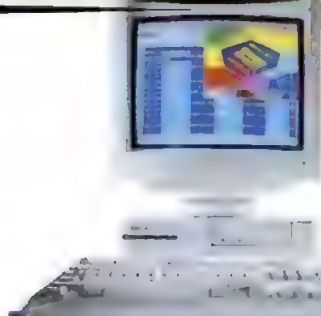


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application requirements and tube preference. The F2-17EX features an ultra fine dot pitch Invar shadow mask flat-square tube, while the T2-17TS features the new hybrid technology aperture grill tube. Both monitors provide the power you need to achieve true-to-life colors, crisp typography and a stable screen image. Flicker-free resolutions up to 1280 x 1024 @ 82Hz refresh rate, Colorific™ screen/printer color matching software and on-screen image controls deliver previously unheard of levels of performance. For added safety against emissions, TCO compliance is now available as a standard feature.

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Scan Freq.	H:30-86kHz, V:55-160Hz
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Max Resol.	1600 x 1200 @ up to 66Hz
On Screen Control	ScreenManager™ and ScreenManager™ Pro
Standards	MPR-II, TCO, FCC B

T2-17TS	
Grill Pitch	0.25mm
Actual Viewing Diag.	16.0"
Scan Freq.	H:30-86kHz, V:55-160Hz
Res. Resol.	1280 x 1024 @ up to 82Hz
Max Resol.	1600 x 1200 @ up to 66Hz
On Screen Control	ScreenManager™ and ScreenManager™ Pro
Standards	MPR-II, TCO, FCC B



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Bill Machrone

The Perfect Desktop

Desktop ergonomics go far beyond typing position and screen refresh rate. We all work at real desks with real papers, phones, and the other assorted detritus that builds up when real work is getting done. I've complained before about the needless desktop

clutter that computers bring, especially the tangle of wires that comes with multimedia systems.

I still love my Cambridge SoundWorks speakers, which, for my money, give the best sound in the least space (aided by a thumpin' subwoofer). I don't, however, love the way my monitor smacks into the speakers when I swivel it or how all the wires seem to braid themselves together while I'm not looking. The hands-down worst offender in the tangling department, though, is my microphone. If you've ever used the mike input on your audio card, you probably gave up in disgust one day when you went to pick up the mike, tugged on the tangled cable, and yanked the power cord right out of the wall, wiping out your evening's work.

Into this snakes' den comes a product that I've wanted for a long time, one that I and other columnists have described in desirous detail. Now that it's here, it's even better than I'd expected. Panasonic's Panamedia 17 monitor is a glorious 17-inch multiscanning monitor that stands up well to the competition from Mag Innovision, NEC, and Sony. It looks ordinary enough, accoutered in beige plastic with a row of adjustment buttons. On each side of the screen, however, are thousands of tiny holes, each a mere 20-thousandths of an inch in diameter. Behind each array is a complicated-looking plastic baffle or waveguide that leads back to a speaker buried in the monitor's innards. The speakers are connected to a stereo amplifier, and front-panel buttons control volume and muting. It sounds great, although a subwoofer that can make your pants legs flap is still the hot ticket for enjoying games.

The Panamedia has a few other orifices of note. Chief among them is a small opening on the monitor's chin. You guessed it—a microphone. I've used key-

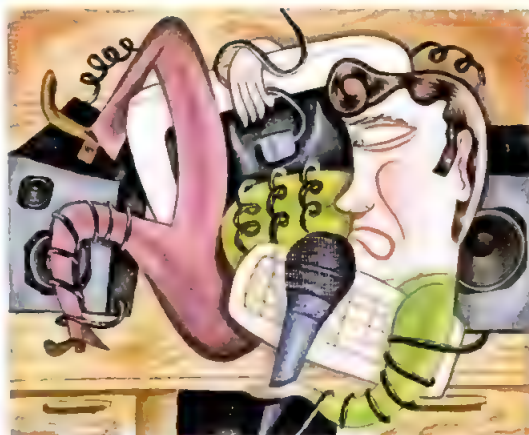
boards with stand-up microphones. They do a good job of getting the mike closer to your mouth. They're not so hot with keyboard drawers, however. I consider a keyboard drawer to be all but essential to proper desktop ergonomics, unless you're at a typewriter-height desk. Both the Panamedia's mike and speakers connect to your sound card via standard connectors on the monitor's rear panel, where the wires don't tangle. If you want headphones or a headset mike, you'll find a pair of jacks located at the lower left front of the monitor.

The current Microsoft Mouse created a stir when it first came out. Most users have praised its ergonomic, asymmetrical shape, but over the last several months more and more people have lodged a common complaint: It's too big. For people with small hands, the Microsoft Mouse is an uncomfortable, humpbacked whale.

I've found something I like a lot better—Kensington's Thinking Mouse. It's smaller than Microsoft's, especially in the critical height dimension. It has a pointy, decidedly mouse-like nose, but its most distinguishing characteristic is its four buttons. Two are at the tip, and two more are just behind them, slightly recessed. All four are programmable, so you can easily

choose which pair to use as your main left and right buttons.

Why do you need an extra pair of buttons? I've defined mine as Forward and Back on my Web browser, and I load different definitions when I'm editing in Word for Windows that turn revision features on and off. The possibilities, while not endless, are a lot greater than two. The Thinking Mouse has the most comprehensive sensitivity and acceleration adjustments I've seen. Coupled with great shape, weight, and texture, it's a winner. □



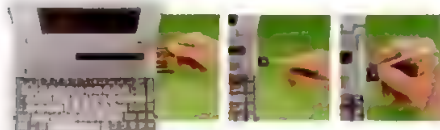
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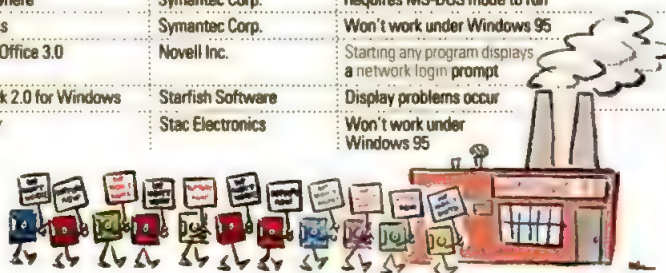
Windows 95's Unfinished Business

You might be ready for Windows 95, but is Windows 95 ready for you? The chart on the right lists a number of popular Windows 3.1 applications that have experienced problems working with Windows 95.

If you find a software program on the list that you can't live without, call the application's vendor and see if the company has a patch prepared or a later release that's more compatible with Windows 95. If not, you may have to wait a little before adopting Microsoft's new operating system.

A much more extensive version of this list, which is updated weekly, is at the Windows home page (<http://www.microsoft.com>). And from October 2 to 6, join Bill Machrone and me on-line, along with guests from Microsoft and other application publishers, to discuss how well Windows 3.1 apps work under Windows 95. Type GO EXEC at any CompuServe! prompt).—TA

Software	Vendor	Problem
Adobe Illustrator 4.0	Adobe Systems Inc.	GPFs may occur if printer uses EMF spooling
Adobe Photoshop 3.0	Adobe Systems Inc.	Changing default settings in common dialog boxes may cause problems
Borland C++ 4.0, 4.02	Borland International Inc.	OLE example programs may not work correctly
cc:Mail for Windows	Lotus Development Corp.	May not be able to read X.400 or VAX messages
CorelDRAW 4.0	Corel Corp.	Drops rotated ATM fonts when exporting a graphic to .BMP, PCX, or TIFF format
Corel Ventura 4.2	Corel Corp.	Horizontal lines appear across screen while scrolling
dBASE 5.0 for Windows	Borland International Inc.	Windows 95 Help reports multiple problems
HiJaak PRO 2.0	Inset Systems Inc.	Cannot capture DOS printer output
LapLink for Windows 6.0	Traveling Software Inc.	Won't work under Windows 95
Macromedia Director 4.04	Macromedia Inc.	Palette windows are sometimes redrawn incorrectly
The Norton AntiVirus 2.0, 2.1	Symantec Corp.	Won't work under Windows 95
The Norton Backup 3.0 for Windows	Symantec Corp.	Won't work under Windows 95
The Norton Desktop for Windows	Symantec Corp.	Won't work under Windows 95
The Norton Utilities 8.0 for Windows	Symantec Corp.	Won't work under Windows 95
pcAnywhere	Symantec Corp.	Requires MS-DOS mode to run
PC Tools	Symantec Corp.	Won't work under Windows 95
PerfectOffice 3.0	Novell Inc.	Starting any program displays a network login prompt
Sidekick 2.0 for Windows	Starfish Software	Display problems occur
Stacker	Stac Electronics	Won't work under Windows 95



Compaq's Deskpro XL Has Trouble Connecting

When we first looked at the network-ready Compaq Deskpro XL (First Looks, August 1994), it seemed that Compaq had answered many network administrators' prayers by building a PC with an integrated Ethernet controller. Then along come the 75-MHz and 90-MHz Pentium-based

shipped after June 1995. Since the first signs of trouble, Advanced Micro Devices (the manufacturer of the Ethernet controller) and Compaq have been working on a solution by trying to recreate the problem in their labs. But what exactly is causing the problem still remains a mystery.

Some network administrators have worked around the problem by disabling the Deskpro XL's on-board Ethernet controller and installing new Ethernet cards. This solution, however, doesn't seem to

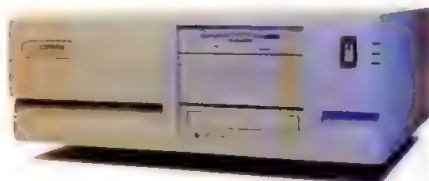
work for everybody. If you contact Compaq's technical-support forums on America Online, CompuServe, or Prodigy, Compaq will suggest that you disable the Deskpro XL's power management by removing VPOWERED.386 from the unit's SYSTEM.INI.

If you or your company has invested in Deskpro XLs, tune into Compaq's home page (<http://www.compaq.com>) and keep the company's technical-support number handy (800-345-1518).—TA

LOOKING AHEAD

Tell me what you love and hate about these products and we'll share the information in future issues.

Internet connections of
America Online, CompuServe, and Prodigy
Image Zip drive
LANtastic for OS/2
Lotus Organizer 2.0
PCMCIA readers
Quad-speed CD-ROM drives
WordPerfect 6.1
ZDS 2-Noteflex



Deskpro XLs, and back come the headaches: Both models lock up when hooked onto a network.

According to Compaq, the problem started with Deskpro XL units

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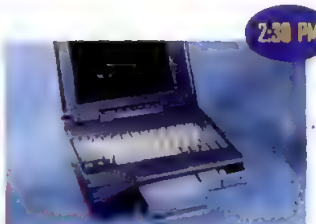
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▶ MS Works 95, or MS Works		▶ MS Office Pro 95, or MS Office Pro	



John C. Dvorak

Win 95 vs. OS/2: Some Thoughts

As *PC Magazine's* token OS/2 booster, I think I qualify as someone who can objectively comment on the two operating systems—and why I'm sticking with OS/2 while I sit back and watch Windows 95 take over the market.

Don't get me wrong: Microsoft Windows 95 is a wonderful operating system, but it has several annoying qualities. You should note that I am not a typical user, because I file all my writing electronically as pure ASCII text. Microsoft has never satisfied me with their cavalier attitude regarding ASCII.

Here are a few examples: When you do a file conversion from Microsoft Word for Windows to ASCII format in Word, you can end up losing text and getting weird non-ASCII complications. It's as though the company hates ASCII, or nobody there ever makes these conversions. Here's another thing: I create a lot of files with names such as PC17 or PC17.95 (the name of this column). I don't think I should be queried by Windows 95 when I double-click on the PC17 icon as to what program should be used to open it. It's obviously a plain ASCII file, and WinPad should automatically open it. In OS/2, the enhanced Editor opens these files automatically.

Overall, OS/2 seems smarter to me. I will say this, though: Windows 95 is a heck of a lot smarter than Windows 3.1 in every way. The key to the success of all versions of Windows over OS/2 was simply Microsoft going the extra inch to support the users, the developers, and the press.

I'm no booster of Microsoft, and Bill Gates has at times complained about my attitude. Still, I got the Gold Windows 95 CD as soon as it shipped in the middle of July. The company has never cut me off, despite my known support for OS/2.

As an aside, here's another key to Microsoft's strategy: Bill Gates puts every employee in an office with a door and becomes the richest man in the world. Coincidence? IBM is a cubicle company. Have you ever visited anyone in a cubicle office? You can't express yourself freely, out of concern that everyone is listen-

ing. Get a clue, Corporate America!

Back to the point: OS/2 has superior characteristics and better multitasking than Windows 95, although Windows 95 isn't as bad as OS/2's loudest adherents would want you to believe. And I'm disappointed in the quirks I've run into since installing OS/2 Warp Connect. For one thing, it crashes more than it should, and keyboard lock-ups are common when you frequently change from full screen to window to full screen. Windows 95 actually seems to crash less. I will say, though, that when Windows 95 does crash, it's a horrible mess.

Anyway, the key to success is applications, and OS/2 has few. Developers seeking a pot of gold will write programs for Windows 95. Microsoft does something IBM doesn't grasp: It promises riches to everyone. Developers will get rich. Employees will get rich. Shareholders will get rich. And guess what? They do. There are a reported 3,000-plus millionaires working at Microsoft—plus three billionaires. Who gets rich at IBM? Nobody except the top boss. And who gets rich doing third-party development for IBM?

Then there are the overt foul-ups IBM makes. An IBMer tries to install OS/2 on a newspaper columnist's machine and can't manage it, and then claims he personally

plans to use Windows 95. Then Louis Gerstner lets it slip that he will dump OS/2 if it doesn't perk up. Before that he asked his executives to call their friends and persuade them to develop for OS/2. This assumed that any of his executives know anyone in the development community in the first place. Hint: They don't.

There are a few of us power users who will stick with OS/2. Without a doubt, changing from OS/2 to Windows 95 isn't that hard, but it's a baby step backward. So, for now, I'm sticking with OS/2 Warp.



The key to success is applications, and OS/2 has only a few.



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John C. Dvorak

Inside Track

Look for **major changes** in the software industry in 1996 and beyond. Insiders at Microsoft (and elsewhere) have been monitoring the market closely and have determined that the **lucrative** market for upgrades is coming to an end. People are tired of spending good money for upgrades to Microsoft Word, Excel, Lotus 1-2-3, and other products, which do not add many features or eliminate many bugs. At some point, **people reject upgrading** and decide to stick with the old version. I recall the long period that WordStar 3.3 stuck in the market, a time when a variety of upgrades were offered and rejected. Users passed on the newer versions, especially the much-touted WordStar 2000, because of **major changes in the file format** that made the upgrades incompatible with the old version.

Microsoft never learned this lesson and has **gone berserk** with the Word file formats, seemingly changing them at will. Users are getting **sick** of this, and many have defaulted to rich text format to maintain compatibility between versions.

Anyway, this kind of information is creeping into the market research **and the big software companies are worried**. To head off any profitability crunch, look for software companies to change site license agreements so they can **extract more money** from large corporations in new ways. Also look for a major move towards internationalization. According to a survey in *Forbes*, the worldwide piracy rate is 49-percent—and as high as **98-percent** in places such as China. This is largely due to the fact that in many countries you can't find a store or a source to buy the software legally, so you have to bootleg it.

New CD-ROM format coming. One of the weird battles taking place is over a new format for CD-ROMs, with Sony and Philips announcing various vendor endorsements for their Multimedia CD format. These disks are also going to be used to replace (they hope) the large videodisk. The new format competes with something called the SD-RAM format that's being promoted by Hitachi, Matsushita, Pioneer, and Toshiba, among others.

As the sides line up opposite each other, the conflict **looks a lot like the VHS vs. Beta battle** that took place in the VCR world. I've been getting a lot of odd press material from each side, announcing that they are the new standard. These new formats deliver up to **5.2 gigabytes on a disk** and are rewriteable—a fact that nobody wants to discuss out of fear that the **copy-protection ogre** will rear its ugly head with Hollywood-

Louis Gerstner is going to put the screws to the OS/2 mavens at IBM. If it doesn't make a profit by early 1996, IBM will rethink its OS/2 strategy. Of course, OS/2 users wonder if there is any strategy to rethink.

incited legislation. Pioneer has a **6.4-gigabyte format** with write-once capability. There is talk about putting **four movies on a disk** using one of these technologies. One format will shake loose by the end of next year. Let me just tell you that until then, from the looks of it, it's going to be **an incredible mess**.

I'll keep you posted.

One thing to note is that according to one source, a movie can be put on one of these disks for a manufacturing cost of **less than a dollar**. You can be sure they'll be selling these disks at McDonalds by mid-1997.

Whither OS/2 Dept.: The word on the street has it that Louis Gerstner is going to **put the screws** to the OS/2 mavens at IBM, and require that a business model for

the software's continuation be developed based on the 1996 first-quarter results. If it doesn't turn a profit, then IBM will rethink its OS/2 strategy. Of course, OS/2 users **wonder** if there is any strategy to rethink.

Genuinely Interesting Hardware Dept.: I don't think anyone would have predicted that I'd be writing about great cables, but here it is. Granite Digital (510-471-6442; fax, 510-471-6267) makes legendary cables—and this is no joke. **Specializing in SCSI cables and terminators**, these cables are specially made to **protect the Ack and Req lines** with special insulation. A high-dielectric PVC layer covers the cables, and internally there is loads of **special shielding** and ferrite beads. When you see one of these black beauties you'll immediately say, "Wow."

The cables all have LEDs to indicate that they are "live." The company also makes a terminator that has a series of LEDs to indicate that the **daisy chain is live, active, and working**. These are very cool cables. And Granite's special internal SCSI cables are unlike anything you've ever seen. Without going into the long rap these guys gave me concerning the difficulties people are having with high-speed SCSI and how Granite cables can solve these problems, let me just tell you to contact these guys and buy their cables. By the way, these gold-plated supercables are impedance matched, too. If you use SCSI you owe it to yourself to avoid the mass-produced cheap cables.

The way I see it, once you have a great SCSI cable you don't have to replace it, and it goes from machine to machine. This is a **lifetime investment**. If your SCSI system seems flaky, these cables might make the difference. Retries fall to nil once you use these marvelous cables. **Highly recommended**. And make sure you use the Granite terminators, too.

Hot stuff for SCSI. □

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CIRCLE 248 ON READER SERVICE CARD





Jim Seymour

Don't Get Gigged

You gotta get a gig. You've probably heard that several times this summer—in computer magazines, on computer television programs, from a coworker. Now that Microsoft Windows 95 has arrived with a loud splat, with new, space-hungry Win 95 apps in

its wake, the word is out that the 80MB, 300MB, even 500MB hard disks that have served us well are history. Half-gigabyte drives are the standard on new machines now and 1-gigabyte drives will take over before year's end. So hurry up: You've gotta get a gig.

Bluntly: That's bum advice. Buy a 1-gigabyte drive now—in a new machine, or as an upgrade, or second hard disk in an existing PC—and you'll soon be looking for even more storage space for data. Before you know it, 1 gigabyte just won't be enough. If you haven't added any new applications in the past couple of years, or upgraded your existing apps, or looked into putting Win 95 (or OS/2 Warp or Windows NT) on your PC, then that must sound insane.

A gigabyte? Not enough? It's insane. We used to think an application that took more than a megabyte was a real space gobbler. More than 2MB was obscene.

No more. Consider some of the new Windows 95 applications and suites. CorelDRAW 6 wants about 130MB of your hard disk for a full installation. No typo there; that's 1-3-0, one hundred thirty megabytes. I can remember when CorelDRAW fit into about a tenth as much space—and at the time we thought it was a hog. But I've been working with DRAW 6, and there's nothing in the box that I would want to give up. Sure, you can leave some or all of the clip art and fonts on the CD-ROM and just pop the CD into the drive when you need any of that—and I do that—but this is still a 100MB-of-disk-space-thank-you-very-much product.

Or consider Windows 95 itself. Microsoft says you can squeeze an absolutely minimum installation of Windows 95 into 30MB (but who wants the minimum with a rich new operating system?) and that a typical user will need about 35MB of space. I haven't found

that user among the hundreds of Windows 95 beta testers and early adopters I've talked with: Most are running closer to Microsoft's claimed 65MB maximum required space. But hey, what are a few tens of megabytes among friends?

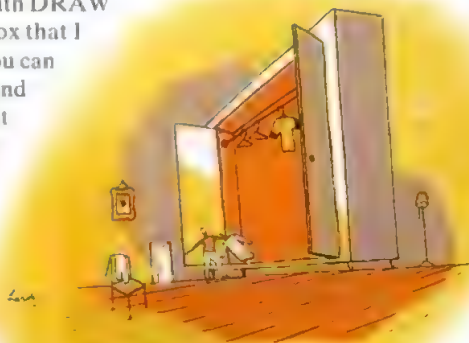
We're also using our PCs in new ways. Mapping software, scans for optical character recognition processing, and much larger data sets abound. And then there's the Internet. Those of us who do research via the Net—which seems to include just about everyone these days—grab documents and graphics left and right, as we spiral downward into the belly of the Web beast. I have almost 100MB of downloaded research files for current projects, and I expect that to triple before I finish the work.

A gig just isn't enough these days. The sweet spot in hard disks right now is 2GB, and I think you ought to seriously consider 4GB units. Prices have fallen sharply over the past six months. Today you can buy fast SCSI disks in the 2- to 4-gigabyte range for as little as 25 cents a megabyte. I'm not talking about old, slow drives, but drives fast enough to support Pentium CPUs.

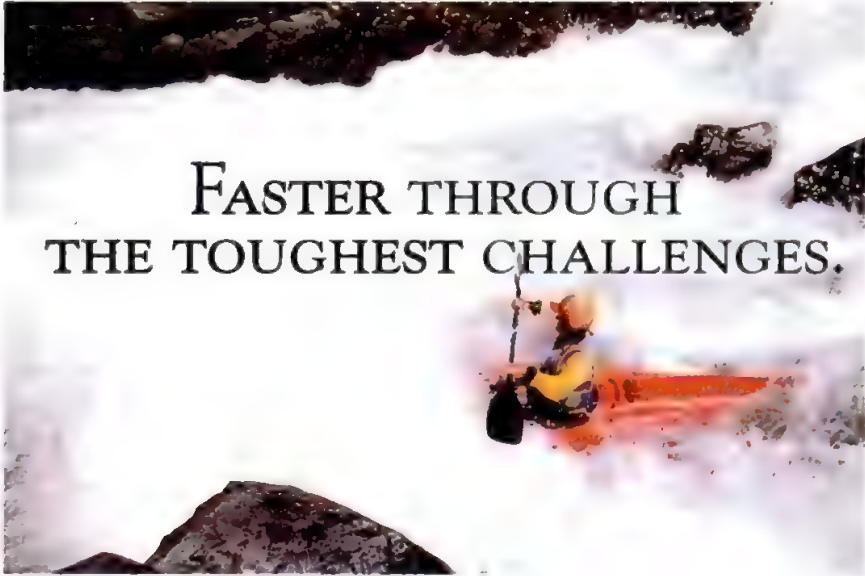
Of course if you're adding a drive to an existing system, or replacing your current drive, a SCSI hard disk will require a SCSI adapter as well, if one isn't already installed in your system. Add \$200 to \$300 for that card.

If your PC has an Enhanced IDE (E-IDE) interface—and most built in the last year and a half do—you can add up to 1.6GB via the largest of the new E-IDE drives. That doesn't quite reach the 2GB threshold I think you should reach for today, but it comes close.

I've been digging around among the new high-capacity, lower-cost 2GB and 4GB drives, look-



Remember when we thought an application that took more than a megabyte was a real space gobbler?



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Jim Seymour

ing for ones that I can recommend. The best buy you can get today is Quantum's Grand-Prix 4.3, a 4.3GB SCSI monster that delivers an 8-millisecond access time for a street price of about \$1,100. Few drives available approach this price/performance ratio; you can easily pay twice as much for that capacity and speed.

Very close to the Quantum in my heart are the new high-performance 2.2GB and 4.5GB SCSI Ultrastar drives from IBM. With 7.5-ms and 8-ms claimed access times, they're screamers. IBM's use of partial-response maximum-likelihood (PRML) technology packs more data into less area on the platters, and its proprietary magnetoresistive (MR) head technology uses separate read and write heads. The results are spectacular. We thought so much of IBM's MR technology that we awarded IBM a Technical Excellence Award last winter, and we're still impressed.

PRICEY PERFORMANCE

IBM drives are pricey. You'll pay about \$1,200 for the 2GB and \$2,000 for the 4GB unit. Other superb, affordable 4GB drives I found were Seagate's \$1,200 Hawk 4 and Conner's \$1,400 Filepro Performance.

With big drives, you'll have to make a tough partitioning decision. Dividing a very large disk into two or more smaller logical drives makes it easier to manage and can make storage more efficient by optimizing cluster size.

Don't push too hard for cluster-size economies, though. I would chop a 2GB drive into three logical drives—at most—and a 4GB into five. Too many logical drives can drive you crazy. I worked on a PC with a 330MB drive partitioned into eleven 30MB drives and it was infuriating. Also, today's big applications can't be divided across multiple partitions.

For some good advice, see Jeff Prosis's "Drive Size vs. Efficiency" in the *PC Magazine* issue of June 27, 1995. His CHKDRIVE utility, available free in ZD Net's FREE-UTIL area as CHKDRV.ZIP, or from <ftp.pcmag.ziff.com> in V14N12.ZIP, can help you make an informed decision on partitioning.

If you're constantly weeding out old files and programs, sometimes making painful decisions about what to erase, you'll love the new big drives. And if you're not...believe me, in the 32-Bit Era, you will be soon. □



Bill Howard

Dead-End Software

Fool me once, shame on you. Fool me twice, shame on me. Too many times, I've fallen head over heels in love with software that seemed—at the time—to be incredibly good. Software that promised improved productivity. As it happened, these products

were never upgraded and never caught on, or vice versa. A year or two later this incredible software was history. Call it dead-end software.

Lotus and Microsoft are responsible for a lot of dead-end software: Lotus for building and then abandoning it, Microsoft for hinting it might create a competing product and so indirectly killing off the competition.

Look in the dictionary under *orphan* and you'll see a picture of the Lotus headquarters in Cambridge, Massachusetts. Dead-end Lotus products include Agenda, Express, Magellan, Manuscript, and now possibly Organizer.

Agenda was a powerful information manager with amazing inferencing—it knew which date “next Friday” meant—but it was too free-form and lacked such necessities as printer drivers. Express was an e-mail package for MCI Mail that Lotus abandoned just as electronic mail picked up steam in the early nineties. Go figure. Manuscript was a too-powerful, too-hard-to-fathom word processor. Magellan could locate any word or phrase on your disk in about 5 seconds and then show you the file in its native format—a 1-2-3 file in a mock 1-2-3 display—without the delays of current file viewers.

Lotus Organizer is the market-leading personal information manager, yet it has all the hallmarks of dead-end software. The upgrade from Release 1 to Release 2 was late, and while there were new features, the updated program ran slowly and program files doubled in size. Also, Organizer is not a strategic product for Lotus. On the Lotus revenue-by-product pie chart, Organizer is part of “Other,” meaning there wouldn't be any effect on the balance sheet if it went away. Even more so now that Lotus is a minor part of IBM—another company that knows a thing or two about dead-end software. I

believe, however, that Lotus will stick with Organizer, in part because it's something Lotus has in its SmartSuite that Microsoft doesn't have in Office.

Organizer was so hopelessly slow with Release 2 that I finally gave up (Lotus has since shipped an interim release) and tried Day-Timer Technologies' Day-Timer Organizer. It's faster but has lots of quirks. In a dozen places where the designers could have gone in one of two directions, I think they chose the wrong path. For instance, the address book comes up showing street address rather than phone numbers; you have to tab to another view to see phone numbers. I don't know about you, but I make 100 calls for every letter I write. A single address card takes up three-quarters of the screen, even in 1,024-by-768 display mode. And like Organizer and virtually every other PIM I've seen, DTO is incapable of printing a *compact* address book page, such as the kind you'd put in the daily planner from which Day-Timer Organizer sprang.

Is Day-Timer Organizer dead-end? Probably not, but Release 1 showed the quiriness that can kill off more complicated software. Still, a quirky, complicated PIM can survive: Witness Ecco.

Personal database software promising a different way of doing things also has trouble getting ahead. Consider Ashton-Tate's Friday and Rapid File (instantly

nicknamed Rapid Fail). Then there are the 3-D spreadsheets such as Javelin and Lotus Improv. R.I.P.

What's the moral? Odd-ball products don't often win out in the marketplace, even if (sometimes especially if) they're technically superb. And as users find themselves repeatedly disappointed by odd products that promise more than they deliver, these users are likely to retreat behind a handful of corporate standards from the major vendors. Unless those products are dead ends, too. □



Beware! The next great software package might just lead you down a dead-end street.

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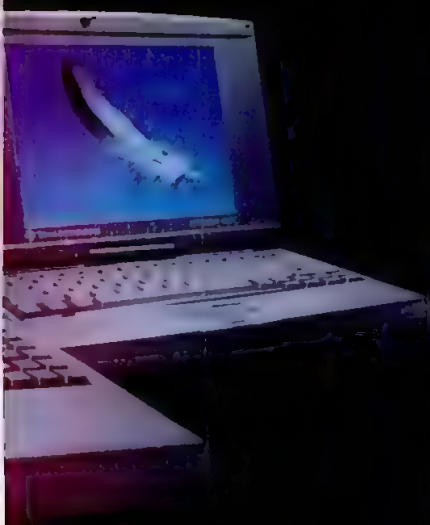
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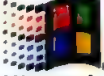
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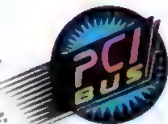


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- Weight: 6.2 lbs.
- Serial infrared port

There are many portable computers from leading manufacturers priced like the new TI Extensa™ 550. Trouble is, they probably don't come with Pentium® processors. They use DX4 or DX2 processors to power the machines. That's a whole generation—or two, behind.

And that's just the beginning. The new TI Extensa 550 extends the power of its Pentium processor with 256KB of L2 cache, allowing the processor to work at maximum operating efficiency.

What's more, the TI Extensa 550 uses the same circuitry (called Peripheral Component Interconnect or PCI) used in most desktop models for blazingly fast video monitors and improved disk drive performance. The TI Extensa 550 also comes with a serial infrared port, which lets you print or share files, wirelessly.

Thus enabling the TI Extensa 550, and its owner, to do some extraordinary things.

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*Integrated CD-ROM and
16-bit stereo sound for full
multimedia capability.*



*PCI Bus architecture
enables optimal
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EXTENSA 550CD

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- 524MB HDD
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or 10.4" Dual Scan display
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- 16-bit stereo sound card,
microphone and speakers
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Thanks to the new TI Extensa™ 550CD, now you can't afford not to take Pentium® multimedia on the road.

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There is also the extra convenience and versatility of the removable CD-ROM drive which allows you to use an internal floppy drive, or even to support a lithium ion battery for longer performance. And with a serial infrared port, the TI Extensa 550CD can print or share files, wirelessly.

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THE INTERNET

Make It WORK For You

The Internet is more than just a playground. It's a place to make things happen and get things done.

By Don Willmott

Go ahead and call 1995 the Year of the Internet, but be prepared to call 1996, 1997, and 1998 Years of the Internet, too. With each passing month, we're seeing more and more signs that the Internet is coming of age as an essential business tool. New interfaces to on-line services, new access tools, easier-to-manage Web servers, and simpler Web publishing tools are all making the Internet more accessible than ever, and you need to know how they work. In this four-part cover story, we evaluate the products that make every single aspect of the Internet more useful to you—whether you're a consumer, a businessperson, or both.



GET CONNECTED

On-line services such as America Online, CompuServe, and Prodigy now offer access to the virtually unlimited resources of the Internet. In "New Paths to the Net," we focus on the Internet access that on-line services provide and compare it with that of traditional Internet service providers. **Page 109.**



SEE THE SITES

Once you're connected, you need software to help you get around. You can choose integrated apps that offer a complete Internet experience or a suite of distinct Internet tools. In **"Beyond Browsing,"** we evaluate 14 products and preview hot new programs that promise to make Web navigation even easier **Page 151.**

PUBLISH TO THE WORLD

Behind every Web home page is an HTML-formatted document. Learning the formatting isn't hard, but editing programs help make it simpler. In **"No Experience Required,"** we evaluate five HTML editors, including some that work with the word processor you already use **Page 203.**

SET UP SHOP

Building a Web site is a complex process that requires tough decisions on your part. In **"A Site of Your Own,"** we evaluate five Windows NT-based Web server packages and test several different hardware platforms to find the easiest way of setting up a successful Web site **Page 227.**

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CIRCLE 347 ON READER SERVICE CARD

GET CONNECTED

New Paths to The Net

Commercial on-line services and Internet service providers are bringing the buzz of the Internet to the masses.

By Rick Ayre

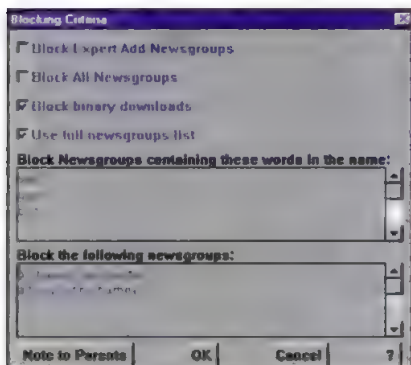


There are two hot stories in the on-line news: One is the Internet; the other is The Microsoft Network (MSN). Yet despite the hype surrounding the Internet and the anticipation for MSN, commercial on-line services managed to grow by 64 percent from June 1994 to June 1995, according to Washington, D.C.-based Business Research Publications—17 percent in the last quarter of that one-year period. And the six biggest commercial on-line services—America Online,

IN THIS REVIEW

On-line services reviewed	
America Online	113
CompuServe Information Service	118
Delphi Internet.....	119
GEne Online Services	132
The Microsoft Network	136
Prodigy	136
Internet service providers reviewed	
AlterDial	140
IBM Internet Connection Service.....	140
internetMCI	146
NetCom Internet Services	147
Pipeline US and Interramp	147
The Best & Worst of On-Line Services	110
Editors' Choice	112
Highlights...	112
The Microsoft Network's Big Debut	116
AT&T Interchange Opens for Business	118
An On-Line Update	
Bigger, Faster, Easier	120
Summary of Features	134, 142, 146

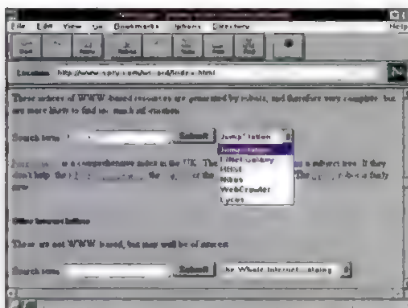
The Best & Worst of On-Line Services



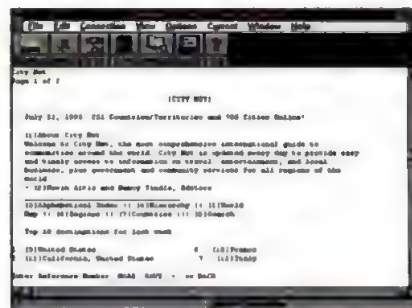
 **AMERICA ONLINE** offers excellent Parental Controls, including the ability to block user-selected newsgroups or newsgroups whose names contain user-selected keywords. A similar degree of control is available for Web pages.



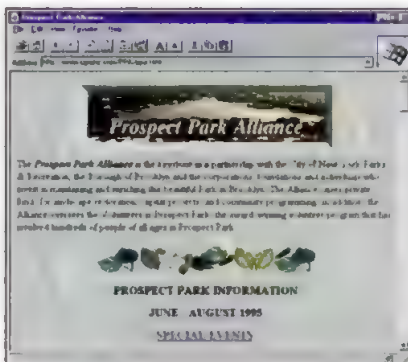
 **GE! for Windows, Version 2.0**, gives you a fully graphical desktop, complete with user-friendly icons. Once you enter the Internet, however, everything—including World-Wide Web access—is limited to text. Navigating the Web is actually faster from a text-only interface, but the experience doesn't match the graphical browsers offered by other services.



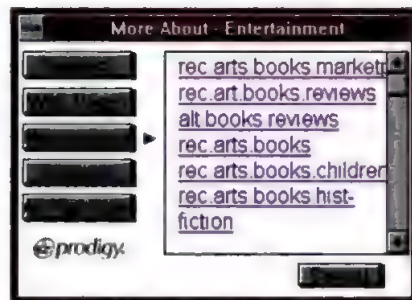
 **COMPU SERVE's** home page offers excellent Internet search capabilities. You simply enter a keyword and choose from menus of up to 50 search engines available on the World-Wide Web, including EInet Galaxy, Lycos, and WebCrawler. You can also jump to the Internet Wizard at Spry's Web site.



 **DELPHI's** hotlists, organized by subject, offer a nice selection of interesting World-Wide Web sites. Delphi's browser is strictly text-based, however, and fails to display the URL of the home page that you have chosen from Delphi's list.



 **MICROSOFT** Internet Explorer Web browser makes great use of fonts, background color, and texture. MSN has begun to integrate links to relevant Internet sites from within its own subject areas.



 **PRODIGY** offers direct links to related Internet newsgroups and Web pages from just about every subject area. Prodigy offers more than 75 of its own Web pages devoted to various subjects. In addition, Prodigy's new interface is HTML-based, offering good integration with the Web.

CompuServe, Prodigy, Delphi Internet, eWorld, and GENIE Online Services—were responsible for most of that growth.

Clearly America Online, CompuServe, and Prodigy, the three largest on-line services, unleashed a marketing blitz aimed at blunting the impact of MSN's entry into the market. Still, their growth

beyond what can be attributed to marketing alone was healthy. Consumers want to be connected. We think they want to be connected to the Internet and that they perceive the commercial service providers as offering the easiest way to connect to the Internet—now often referred to as the data dial tone.

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For this feature we looked at the Internet connectivity offered by America Online, CompuServe, Delphi Internet, GENIE, and Prodigy as well as an early version of MSN. We'll also update you on the new content and interfaces these providers have added since our last review of on-line services ("The Changing Face of On-Line," February 21, 1995).

We also look at a rapidly emerging group of national and local Internet service providers. Among these are some of the recent darlings of Wall Street, such as NetCom, Performance Systems International (PSI), and UUnet. National providers have long offered businesses direct

Internet connections but are now getting into the end-user dial-up Internet-connectivity market. IBM and MCI have recently begun offering dial-up services, and most of the Baby Bells around the country have announced they will enter the market soon.

We looked at these five providers—IBM, MCI, NetCom, PSI, and UUnet—for this feature. We've also included a table with information for 36 local service providers in the U.S. For information on more than 1,000 local providers worldwide (listed by area code in the U.S. and Canada), check out The List, sponsored by Internet Direct and I-Site, at <http://thelist.com>.

You can connect to the Internet via custom software that dials a national Internet service provider. Two prominent products are NetCom's NetCruiser and PSI's Pipeline USA. We take a look at those products in "Easy Access to Service Providers," elsewhere in this issue. The vendors of these products claim they give customers the ease of an on-line service at the price of an Internet service provider. They're definitely worth consideration.

How do you choose which number to call for your data dial tone? If you believe the companies' marketing, there are two ways to connect: easily or cheaply.

FIRST, IT MUST BE EASY

America Online, CompuServe, and Prodigy all claim to offer the easiest way to connect to the Internet. That may be true. All three have made great strides improving their ease of use in general, and their Internet services can be reached just as easily. Delphi and GEnie have not kept up in this race, which is rapidly shrinking from the big six to the three that really matter, plus upcoming services such as Microsoft Network, AT&T's Interchange, and CompuServe's new service, code-named WOW!, which is geared for less experienced users and is scheduled to begin in early 1996. (Apple Computer's eWorld is included in the six but is not yet accessible to PC users at all.)

On the other hand, Internet service providers have faced the challenge directly as well. And software such as NetManage's Instant Internet, which you can use to connect to and configure Internet accounts with many service

On-Line Services Internet Access:

America Online

Internet Service Provider:

Pipeline USA and Interramp

Like any other relationship, life with your Internet access provider can be both thrilling and aggravating.

Every detail—from the software interface to the technical support to the speed and reliability of the network—will affect your feelings about the service. Each service we looked at had its endearing traits, but some were just too good to resist. We divided the providers into two categories and awarded an Editors' Choice in each: on-line services and Internet service providers. On-line services provide full content on their own, plus easy access to the Net and pricing plans geared to the occasional Net user. Internet service providers are more targeted at heavy Internet users who know what they want and like to choose their own access software.

THE RACE TO THE NET

America Online (AOL)—with its friendliness, robustness, and responsiveness—gets our Editors' Choice for Internet access from an on-line service. AOL is currently the only commercial on-line service with nationwide 28.8-kilobyte-per-second (Kbps) access, via its AOLNet network. It had one of the most flexible and impressive Web-browser implementations and was one of the first services to allow any Winsock-compatible browser to run over its network.

AOL also does a great job of integrating Internet offerings with its own, providing direct links to relevant Web pages from most of its own subject areas. And perhaps most importantly, AOL was one of the easiest services to set up and use.

Prodigy gets an honorable mention for its much-improved interface and its own notable Web browser. With a

maximum 14.4-Kbps connection, though, loading graphics-heavy pages can be eye-crossing. (The company says it hopes to upgrade to 28.8 Kbps by the end of the year.) Prodigy also gets points for providing users their own Web pages free of charge, something that AOL is planning to include soon.

CompuServe, which acquired Spry last year, has made quantum leaps toward full Internet access, but its implementation is not as smooth as AOL's or Prodigy's. A new version of WinCIM in the fall should include an integrated browser and other enhancements. CompuServe also has promised nationwide 28.8-Kbps access by next spring.

The Microsoft Network, which is bound to be an impressive competitor of the big three, had very good Internet features; but the service is as yet untested.

Delphi Internet and GEnie Online Services lost big points for their text-based interfaces for Internet connectivity. Look for both to incorporate graphical tools in the near future.

FLEXIBILITY AND ECONOMY

On the other side of Internet service are the traditional Internet-service providers (ISPs). More important in this group were flexible options, good pricing, fast connection, and technical support.

Our Editors' Choice for Internet service provider is awarded to the Pipeline USA and Interramp services from Performance Systems International. No other provider we reviewed gave us more for our money or offered a wider range of options.



providers, is almost as easy to use as the software provided by America Online and Prodigy.

SECOND, IT MUST BE CHEAP

Here is where the Internet service providers raise their hands. We're cheaper, they say, and we have flat-rate plans that will let you surf the Internet for as many hours as you like, for one monthly fee that you know and have agreed to.

But here, too, the difference a year ago was greater than it is today. Competition is a great equalizer, and since we last reviewed on-line services they all have reduced their rates. And while most of the Internet providers have flat-rate plans, usually for around \$25 per month, the commercial on-line services are competitive: At AOL's current pricing, for example, the

average customer's monthly bill is just a little over \$16.

The moral to this tale is that if you are on-line a lot, and apparently most people aren't, then you want a flat rate. If you are not on-line a lot and your on-line bill is less than \$20, then stay with the service you like the best.

*The big three are
getting ready to offer
ISDN access, and
Internet providers
that don't offer it now
will soon.*

CONTENT: STILL THE KING?

The service you prefer, if you are like most people, is the one that is easiest to use *and* the one that offers the content you want. You want at least to be able to access the Internet to browse the World-Wide Web. Chances

are you'll also want to read Usenet newsgroups, which are not on the Internet but are still thought of by many as part of that vast, loose bucket brigade of computer networks. You'll also want to transfer

files using FTP. Some people will want to use the Gopher system, mostly to search academic sites for information or files.

You get all that now, from America Online, CompuServe, Prodigy, Delphi, and GENie, plus you get access to the proprietary content each service has to offer. That content may be considerable (see "The Changing Face of On-Line" for details), and some particular content may be considerably important to you.

FAST IS ALSO NICE

You can use the World-Wide Web with dial-up service at 14.4 Kbps, but it is not really enjoyable until you use speeds of 28.8 Kbps. America Online offers the most extensive 28.8-Kbps access as we write. Prodigy says it will roll out 28.8-Kbps service late this year, and CompuServe says it will have upgraded its network nationwide by next spring. You will have to decide what such promises are worth. The top three Internet service providers—NetCom, PSI, and UUnet—all offer 28.8-Kbps service in most of their service areas.

Expect this all to get a lot faster. The

HIGHLIGHTS

Internet Access

The on-line industry today is hardly recognizable from what it was just last year. All the commercial on-line services seem to have tacitly agreed: The Internet's the thing. Once, you had to struggle to figure out how to send e-mail from an on-line service across that mysterious Internet expanse. Now the big three—America Online, CompuServe, and Prodigy—are falling over themselves to plug into the Net.

NEW INTERNET SERVICES

from each of the five major commercial on-line providers have shifted most of them from mere e-mail capability into a Net-centric world. Each of the big three has introduced a Web browser and expanded its overall Internet services; Delphi Internet and GENie, although still text-based, plan to offer graphical Internet tools of their own in the near future. (A sixth on-line service, Apple Comput-

er's eWorld, recently launched a Web browser of its own, but it is still unavailable to PC users.) We've reviewed the Internet features of all five along with The Microsoft Network. We have also updated other new developments that have been added to the services.

INTERNET SERVICE providers (ISPs) are in some ways best equipped to give the commercial on-line players serious competition. They can offer higher-speed access and flexible software options, all for a lot less (depending on how much time you need on the Net). While in the past, ISPs have been notoriously poor with technical support and ease-of-use comfort, all are starting to provide entry-level packages for the uninitiated, such as NetCom's NetCruiser and Performance Systems International's Pipeline. We rate five national dial-up service providers: IBM Global Network,

MCI's internetMCI, NetCom's NetCom Internet Services, Performance Systems International's Pipeline USA and Interramp, and UUnet's AlterDial.

THE MICROSOFT NETWORK—

poised to shake up further a rapidly changing field—has been a hot topic but at press time had not yet officially launched. The threat of MSN perhaps spurred the on-line services to buff their offerings and prepare for the worst. In any case, we were able to take a look at the prelaunch service and Internet features—and MSN looks as good as America Online, CompuServe, and Prodigy fear it is. AT&T Interchange, meanwhile, quietly launched its service this summer. Despite its well-designed infrastructure of links, Interchange lacks what the masses most desire: Internet connectivity. We expect to see it add Internet capabilities as soon as it can.

competition for your usage will lead to pressure on usage rates, which will likely continue to drop.

Of course, no matter what speed you connect at, the service is only any good if you *can* connect, and the rapid increase of users has led to service problems in some cities for a few service providers. That's true among the Internet providers as well as the commercial providers. The service problems are sporadic, local, and hard to verify. The best way to find out if the provider you are considering has problems meeting caller demand in your area is to ask current subscribers.

WHAT THE FUTURE HOLDS

Still in the future as we write is the launch of MSN. You may have a good sense of how successful it will be, and everyone is watching. One thing is clear: MSN is serious about the Internet. The service should launch with full Internet access.

Two years ago the commercial service providers said they would compete head to head with the Internet, and they would win. Early this year they began to change their tune, saying they get you to the Internet with greater ease. Now it seems likely that the most successful commercial-service provider will be the one that best integrates its own content and the that of the Internet into an interface that makes both equally easy to use.

America Online and Prodigy are already doing that—and doing it well—and you can expect them to get better. CompuServe has some catching up to do, but it has a lot of valuable content and motivation.

As we move forward you will be able to think of the big three (and perhaps Microsoft Network) as part of the Internet, in their content as well as in connecting users. Where does that leave the national service providers? Unless they can add value to the service they are providing, it will rapidly become a commodity. The national service providers are, of course, planning on doing just that.

Look for America Online to offer dial-up Internet access and launch it soon on the platform they acquired from the Global Network Navigator. Look for NetCom, PSI, and UUnet to offer more services to their users: features like the ability to search and find the content they want, easily and as quickly as possible.

INTERNET ACCESS ON-LINE SERVICES

America Online Inc.

America Online

BY MICHAEL RYAN



America Online's more than 3 million members have been clamoring for better Internet tools. America Online (AOL) has responded with access speeds up to 28.8 Kbps and America Online for Windows, Version 2.5, which adds an optional integrated Web browser to AOL's existing FTP, Gopher, and Usenet offerings. The combination of good Internet access, useful navigation tools, and low pricing (\$9.95 per month for five hours of use; \$2.95 for each additional hour), make AOL the best way to get on the Net via an on-line service we've seen.

AOL, like Prodigy, has integrated its Web browser into the service's interface. To access the Web, you simply click on a button labeled Internet Connection on the opening screen; you then get a menu that gives you access to FTP, newsgroups, Gopher, and AOL's Web browser. Also, most non-Internet sections of AOL now include a Globe icon that yields a Top Internet Sites menu of related Internet resources.

AOL's browser is HTML 2.0-compliant, with 3.0 support planned for the near future. It offers the usual Back, Forward, Home Page, and Stop buttons and the ability to build a list of favorite places. AOL's home page includes a fairly extensive Favorite Places hotlist divided into categories such as publications, computers, and sports, and direct access to the WebCrawler Web-search page. In late 1995, AOL plans to provide the capability for users to create their own Web pages and store them on AOL's server.

There are several ways to download AOL, Version 2.5, and AOL's Internet tools. The easiest way is to type the keyword Upgrade; AOL's Web browser downloads along with Version 2.5. You can then install both using a quick and easy setup utility. When you're finished installing Version 2.5, you can go back on-line and access the browser by clicking on Internet Connection and the World-Wide Web button.

If for any reason you find AOL's browser insufficient, you can use any Winsock-compatible Internet application—including other browsers—with AOL. You do this by downloading and running AOL's Winsock, which was in beta testing at the time of this review but available to all AOL users.

New to AOL are Road Trips, which are live interactive guided tours through popular Web sites and AOL resources. AOL hosts many of its own Road Trips. Users can host Road Trips by entering a list of



America Online lets you take other users on your own Road Trips—interactive guided tours through Web sites and AOL services.

Web sites into a Trip-planning screen, then entering a chat room and taking other chat-room members with them on a live tour.

While the Usenet newsgroup reader is not new, it is certainly improved. You can access more groups than before—over 20,000, according to AOL—but still only a subset of all available newsgroups. And the newsgroup reader interface is better organized than the previous version. And you can now download your favorite newsgroups for off-line reading, something that no other service offers. Help menus and publications about the Internet are abundant on AOL and appear in just about every menu screen. In all, AOL provides excellent Internet access for both novices and veterans alike.

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The Microsoft Network's Big Debut

By Padraic Boyle

Scheduled to be offered as part of the Windows 95 operating system at press time, The Microsoft Network (MSN) combines an object-oriented interface with content similar to America Online and CompuServe and full access to Internet facilities and e-mail. (For more information on MSN's Internet access, see the review in this feature.) We looked at final code for MSN's software, but the service was still in beta.

Most on-line services offer access software that runs under DOS, Windows 3.x, and Macintosh, but the Microsoft Network cannot be run without first making the move to Windows 95. (A Windows NT Workstation version of MSN is scheduled for 1996.) If you have already upgraded to Windows 95 or purchased a system with Windows 95 installed, then you already have access to the MSN software.

To connect to MSN for the first time, you enter your credit card number, area code, mailing address, and other dialing properties into a dialog box. After dialing the service, you choose a member ID and password, and the service provides access numbers based on state and area code. Connection speeds to MSN are available from 9.6 Kbps to 28.8 Kbps and via 64-Kbps ISDN throughout most of the U.S.

Microsoft plans to offer four pricing plans: \$4.95 per month for 3 hours' use, plus \$2.50 for each additional hour; \$19.95 per month for 20 hours' use, plus \$2 for each additional hour; \$49.95 per year for 3 hours' monthly use, plus \$2.50 for each additional hour; and \$39.95 per year for the first 500,000 members only, including 3 hours' monthly use and \$2.50 for each additional hour.

If you like Windows 95's object-oriented interface, you'll find navigat-

ing through MSN a breeze. To enter a selection, simply click on the appropriate icon. Each selection has folders for a specific topic. A toolbar lets you navigate between sections, folders, and desktop areas; add subjects to your Favorite Places area; and create shortcuts. One pet peeve is that the toolbar is not activated by default. You must choose it from the View menu.

When you connect, MSN displays a five-selection graphical-image map. The first selection, a daily updated

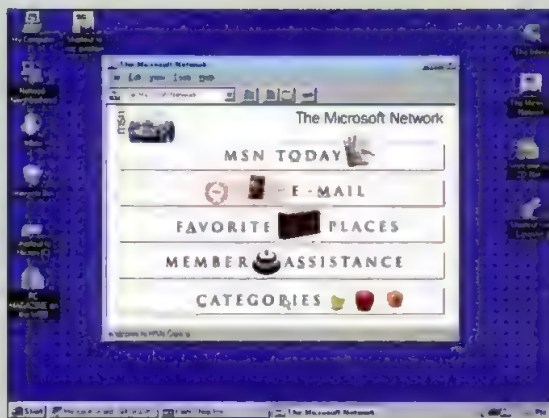
You can also report possible bugs and locate numbers for technical support.

Click on the last selection, Categories, and you'll find the Content areas, which are divided into folders. Each folder is for a specific area, such as Sports, Health, and Fitness. Subfolders within the Content folders offer more specific topics (such as Water Sports). Each topic folder contains Bulletin Board Services (BBSs), similar to CompuServe's forums, with information on the chosen subject that often includes a list of associated Internet Usenet newsgroups and Web sites.

As you move through MSN you will definitely find subjects that spark your interest. Using the Favorite Places icon, you can add your preferred subjects in one folder so that you can get to your favorite parts of the service. You can also create your own links to documents, known as Shortcuts, and store them on your desktop as icons. Click on a shortcut and it takes you directly to the appropriate subject, program, document, or printer. You can even drag-and-drop shortcuts into documents or e-mail messages where they retain their operational value.

MSN has some 240 content providers currently signed on, and additional providers are likely. MSN's content, combined with its access to the Internet, is fairly comprehensive: Subjects span from arts and entertainment to home and family and to business and finance.

MSN offers software-development kits and APIs (Application Programming Interfaces) to help content providers create client/server applications and gateways. MSN also plans to offer Blackbird, an object-oriented language with drag-and-drop capabilities that is easier to use and more powerful than HTML for creating content pages.



Click on Categories and you'll get to The Microsoft Network's content areas, arranged by folders.

newspaper MSN Today, lists upcoming events and discussion groups with guest speakers. From MSN Today, you can enter those discussions.

Also on the opening screen is a selection for MSN's e-mail, which uses Microsoft Exchange (a version of which is included with Windows 95). Similar to other on-line services' e-mail, Exchange lets you send mail to users on MSN or on the Internet. There's a personal address book for storing lengthy addresses and associating them with short names. Exchange allows you to read and create messages off-line. The next time you connect to MSN the mail is replicated.

Another main-menu choice is Member Assistance, with etiquette tips, MSN-use guidelines, and Frequently Asked Questions (FAQs).

One laser printer.

One great big problem.

One color inkjet printer.

One network node.

One dot matrix printer.

One great little solution.

Introducing the HP JetDirect EX Plus3 print server.

Now you can connect up to three parallel printers to a single network node.

Your office has all kinds of printers, and all kinds of printer configurations, all of which can change daily. And it's your job to hook them all

up to the network. With a limited number of nodes, that can be a big problem.

Fortunately, there's an easy way out – and in. The new HP JetDirect EX Plus3 print server lets you connect up to three printers to the

network, using only one LAN connection. Best of all, it works with any parallel printer, and supports virtually every network protocol and NOS out there.

For fast faxed information, call 1-800-964-1066.* You'll discover that for every problem, there's a solution. At least when it comes to network printing.

NOS Compatibility: Novell NetWare; Microsoft® Windows™ 95, Windows NT, Windows for Workgroups, LAN Manager; IBM LAN Server; UNIX®: HP-UX, SunOS, Solaris, IBM AIX, SCO UNIX, Ipd; Apple EtherTalk

Management Support: HP JetAdmin print management software enables consistent installation and management of any HP JetDirect connected printer on the network;

supports SNMP-based network management software

- Flash memory for easy upgrades
- Multiple protocols with automatic switching
- Three high-performance IEEE 1284 ports
- 3-year return to HP warranty
- HP JetDirect EX and EX Plus3 print servers support all parallel printers
- HP JetDirect cards support HP printers with I/O slots



**HEWLETT®
PACKARD**



AT&T Interchange Opens for Business

By Jenny Donelan

Finally launched this summer, AT&T Interchange Online Network has a lot going for it: a bright, graphical look; easy-to-use links to documents, discussions, and software; and powerful searching and off-line capabilities. But except for e-mail, it doesn't provide any Internet access.

Interchange representatives are quick to point out that the service runs on TCP/IP and that a range of Internet-related services are planned to be offered on the service in short order. A Web browser may be available by early autumn, with FTP, Gopher, and Usenet newsgroups access following shortly thereafter. The company has not said whether the browser will be a proprietary or third-party application. For now, it's counting on the product's unique interface and specialized content to attract users.

The service differs from services such as CompuServe or Prodigy in that it is an electronic-content publishing platform rather than a general-interest service. It's not possible to subscribe to Interchange alone: You must sign up with one of the four companies publishing on-line content. These include Star Tribune Online from the Minneapolis-St. Paul newspaper, *The Washington Post's* Digital Ink, ZD Net/AT&T Interchange Edition, and Gartner Group's @vantage.

The Interchange model for content

providers is to keep a narrow focus. The two newspapers serve specific demographic populations, Gartner Group targets information technology professionals, and ZD Net caters to computer-savvy users.

Users can navigate AT&T Interchange by pointing and clicking on icons for discussion folders and down-

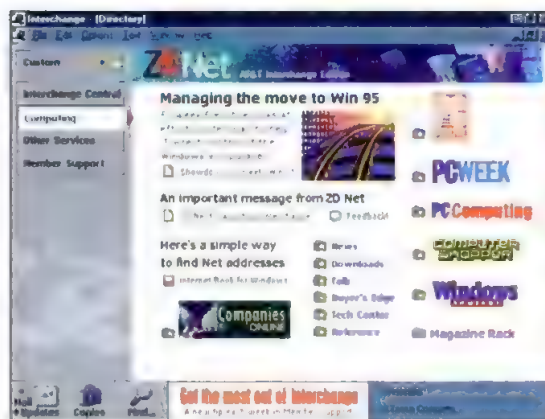
wise useful and powerful. A search on the keyword *32-bit* in the ZD Net/AT&T Interchange Edition brought up hundreds of articles from all areas of the service, including discussion threads.

Interchange touts its multitasking ability: It's possible to have Interchange download a piece of software and search on a keyword at the same time that you're waxing profound in the talk areas. But depending on your hardware configuration, you may have to wait a minute or two before the tasks begin. Interchange has been upgrading its software on a monthly basis, and performance continues to improve.

Customization is another of Interchange's strong suits. By choosing Keep Updated from the menu bar or by dragging a discussion or folder to your in-box, the service will update those items in your mailbox. You can schedule

unattended sessions during which Interchange will dial in, retrieve the specific information you want, and leave it in your in-box.

Because AT&T Interchange is a relatively new service, downtime and glitches are still not unfamiliar. As of July, the platform was still being brought down for routine maintenance from 3 A.M. to 6 A.M. on weekdays, and from 5 A.M. to midmorning on weekends. It should be available 24 hours a day by the time you read this. Customer support rep-



Navigating Interchange is as easy as clicking on icons for discussion folders and software downloads.

loadable software. Linking one item to another is as easy as dragging and dropping or cutting and pasting an icon into a document. Say you're participating in a discussion about Pentium notebooks in *PC Magazine's* area; you can paste a copy of a folder icon containing a related notebook discussion you saw in *PC Week* into one of your messages. A click on the pasted discussion icon will transport you to the related *PC Week* item. You can also drag and drop icons into your own custom pages. Searching is like-

CompuServe Inc.

CompuServe Information Service

By MELISSA J. PERENSON

CompuServe's Internet access lagged behind that of its competitors until it acquired Spry, maker of Internet-in-a-Box (reviewed in this issue), in March 1995. CompuServe doesn't offer as much assistance navigating the Internet as ei-

ther AOL or Prodigy. Nor does CompuServe seamlessly integrate Internet offerings with its own. But you do get full access to FTP, telnet, Usenet, and the World-Wide Web, and new pricing options make CompuServe a lot more competitive. The Internet Club offers the most reasonable pricing scheme: \$24.95 for unlimited basic CompuServe services and 20 hours of Internet use and \$1.95 for each hour thereafter. Different pricing is

available when using CompuServe as bundled in Internet In A Box (\$9.95 for 7 hours or \$19.95 for 20 hours).

At press time, CompuServe announced that it would rapidly expand its Internet features by year end—enabling a Web browser with built-in security, Web publishing services, and customized on-line services for businesses and local communities—and roll out two new interfaces. The company also announced plans for a new

representatives are unfailingly helpful and available via a toll-free phone call.

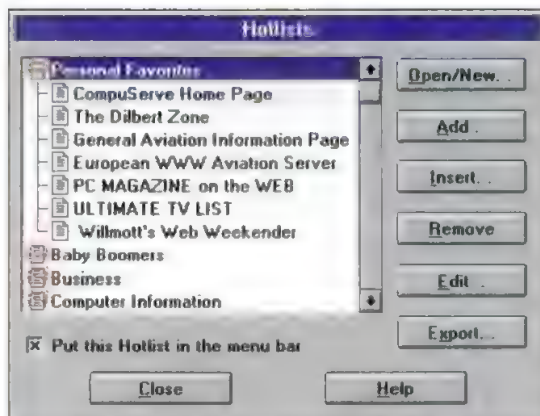
Pricing for AT&T Interchange varies depending on which module or modules the user subscribes to. Current pricing for an account with ZD Net/AT&T Interchange Edition is \$9.95 a month, which consists of a \$4.95 network-access fee for Interchange Central, and a \$5 fee for the ZD Net module. Currently, *The Washington Post* and ZD Net have a cross-subscription agreement so that subscribers to one service have access to the other at no additional charge. A ZD Net/AT&T Interchange Edition charter offer, which waives the \$4.95 access fee through the end of 1995, is available through October 1995.

AT&T Interchange began life as The Interchange Online Network, which was founded by Ziff Communications Co. The service was sold to AT&T Corp. in late 1994. Interchange's latest plans are to expand with Europe Online, which has chosen the service as a platform for its European multimedia service. Europe Online is scheduled to launch simultaneously in English, French, and German in late 1995. **ZD Net/AT&T Interchange Edition**, 800-595-8555. **Gartner Group's @vantage**, 800-697-5652. **Minneapolis Star Tribune Online**, 800-343-4711. **The Washington Post's Digital Ink**, 800-510-5104.

AT&T Interchange Online Network, 25 First St., Cambridge, MA 02141; 617-252-5000; Web, <http://www.ichange.com>.

consumer on-line service (expected to be priced lower than CIS) and a revamped pricing structure.

Currently, FTP, telnet, and Usenet can be reached via the Internet icon on WinCIM 1.4's opening screen. You can also download the NetLauncher Web-browser software from this menu; expect the file to take about half an hour at 14.4 Kbps. CompuServe's Windows-style terminal-emulation interface gives a func-



CompuServe lets you add your favorite Web sites to a hotlist and organize the links via folders.

tional yet decidedly separate and unintegrated feel to using FTP and Usenet, though you do have full, uncensored access to FTP and Usenet sites.

CompuServe, unlike the integrated Web browsers of AOL and Prodigy, makes you launch a completely different session for Web access. The browser has some nice conveniences. A status line on the bottom shows your progress while loading a document, and you can scroll through a document even if it's still loading. NetLauncher includes a good-size, eclectic collection of URLs already stored in its hotlist. You can add your own favorite Web sites to the hotlist and organize them using the hotlist's folder metaphor.

The biggest drawback to this browser is that there's no straightforward way to save a Web page to your disk, beyond using the load-to-disk feature, which is useful only if you know before opening a URL that you want to save that page.

The CompuServe home page has a variety of information about CompuServe and the Internet. HotLand offers an assortment of links to Web sites organized by category, but the lists lack variety, depth, and—most importantly—timeliness. For example, the site still listed Viacom's now-defunct *Star Trek Generations* Web page six months after the movie left theaters.

The stand-out feature of CompuServe's home page is the organized manner of searching

the Internet. Using a forms-based interface, CompuServe's search page offers you almost 50 different engines with which to search the Internet. It's as simple as entering the keyword to search on and selecting which of the search engines to use. There's also Spry's Internet Wizard, which was still under construction during our testing.

You can use any Winsock-compliant Web browser over the CompuServe PPP connection. WinCIM 2.0, scheduled for September 1995 release, will be able to use the PPP dialer for

regular service connections as well as the Web, enabling direct links from the main service to the Web. CompuServe also plans to let users create their own Web pages, as Prodigy does now, and has announced plans to introduce a second new CIS interface by the end of the year.

CompuServe now has many 14.4-Kbps connections, which provide acceptable performance; 28.8-Kbps service will not be fully deployed nationwide until May 1996.

Delphi Internet Services Corp.

Delphi Internet

BY MELISSA J. PERENSON

Delphi Internet was one of the first on-line services to offer full Internet access and lives up to its name with a wide variety of Internet features, including FTP, newsgroups, Gopher, telnet, and the World-Wide Web (text only) as well



If you want a sneak peek at what Delphi plans to offer with its upcoming Web browser, check out Delphi's home page at www.delphi.com.

An On-Line Update: Bigger, Faster, Easier

In the few months since we reviewed the full content of commercial on-line services ("The Changing Face of On-Line," February 21, 1995), the landscape has changed tremendously. Not only have all five of these consumer-oriented providers added the Internet features detailed in the main roundup, they've lowered prices and made their content more visually exciting. Here's a summary of what the on-line services have brewed to try to win your favor. We've also updated our Suitability to Task ratings since last time (see the table below). For a detailed explanation of how these ratings were devised, see "The Changing Face of On-Line," February 21, 1995.

AMERICA ONLINE

With enhancements in its new front end, America Online (AOL) is pretty much the same well-rounded, easy-to-use service we reviewed. Higher-speed access is the most notable improvement: AOLNet, which provides up to 28.8-Kbps access, is now available in more than 80 cities. Where local numbers are unavailable, a new 800 number is available for \$4.80 per hour.

Other changes include beefed-up e-mail service that now supports on-line message storage; but you still can't send e-mail attachments to non-AOL members. A prominent new feature is AOL's new graphical format, called Rainmaker, which allows for some

spectacular menus—check out MTV Online for a sample.

COMPUSERVE

CompuServe has evolved considerably since our last review. WinCIM 1.4 has a sleeker interface and new features. CompuServe has updated more of its content to the enhanced menus supported by WinCIM 1.4. Expect more interface enhancements and integration of Spy's Web browser with the release of WinCIM 2.0 later this year.

The service has improved its comprehensive content offering with the addition of several popular magazines, including *Fortune*, *People*, *Premiere*, and *Sports Illustrated*. And many existing areas, such as CNN, have expanded their offerings. CompuServe still maintains some of the best discussion and support forums around.

DELPHI INTERNET

Although not much has changed at Delphi since our last review, at press time, News Corporation, Delphi's owner, announced plans to replace the service with a new on-line venture with MCI Communications Corp.

Delphi had previously announced plans for a totally revamped system developed around Netscape. Some of the highlights include a Netscape Web browser, 28.8-Kbps dial-up connection speeds, an FTP client application, and improved and graphical e-mail.

GENIE

Since our last review, GENie has eased installation with an auto-configuration feature. The new GENie for Windows also has a completely new look with Version 2.0. The new desktop consists of 18 icons that take you to specific content areas with one click of the mouse.

GENie has added an enhanced e-mail manager and address book that make sending mail across the Internet a virtual breeze. GENie now supports a maximum connect speed of 14.4 Kbps but is planning to upgrade to 28.8 Kbps.

PRODIGY

Prodigy, too, has a new interface, which you will be required to download if you don't already have the software. Based on HTML, it opens new doors to content that is different from what you are used to seeing on Prodigy. The new content areas are filled with high-resolution color images and include embedded links to related information on the Web.

A subtle yet welcome change is more discrete advertising: only a small corner instead of a strip across the bottom of the screen. The features Prodigy promised us at the beginning of the year are not all there yet. Just beyond the main screens is the same old interface. The sooner Prodigy deploys its areas for the new interface, the easier and more exciting it will be to use.

Suitability to Task

Blue text indicates a higher rating than the service earned in our roundup of February 21, 1995.

	America Online	CompuServe	Delphi Internet	GENie	Prodigy
Installation and orientation	Excellent	Good	Fair	Good	Excellent
Content	Good	Excellent	Good	Excellent	Good
Interface	Excellent	Good	Fair	Good	Good
E-mail	Good	Good	Poor	Good	Good
Discussion groups and forums	Good	Excellent	Good	Good	Excellent



BORN IN A BARN?
ACTUALLY, YES.



We share the vision of being our customers' only logical choice

1986

The Livestock Exchange Building cockroaches were this big.

March 1988

Phone system expanded to 10 lines!

1988

Earle Grueskin, our first former Sioux City mayor, joins the payroll.

February 1988

25 systems built and shipped in one day! All 10 phones ringing off the hook from Gateway's first major ad in *Computer Shopper*, "Computers From Iowa?"



1989

It doesn't get any better than this — standard VGA monitors on all PCs!

June 1989

Gateway goes online with GW2k BBS.

December 1989

McGraw-Hill purchases 386-20s and achieves immortality as Gateway's first major Fortune 500 customer.

January 15, 1990

Gateway moves digs in North Sioux City. 185 employees, shipping 225 PCs.

February 1990

Ted thinks, "Gateway is big — better slogan." New logo and "You're my friend in the business" are introduced.



1987 Annual Sales: \$11.7 million Employees: 8

1988 Annual Sales: \$11.7 million Employees: 33

1989 Annual Sales: \$70.5 million Employees: 185

1987

Texas Instruments PC customers exchange TI PCs for Gateway 2000 IBM compatibles.

February 1987

Ted and Mike get sick of looking at each other. Up go the first cubicle walls!

1988

EGA color monitors standard on all systems.

1988

Ted hires high school kid (future Manufacturing Director) to spray paint Gateway logo on plain white boxes.



September 1988

Gateway herd finds greener pastures in Sergeant Bluff, Iowa (we moved there).

1990

The popular Sioux City is whopping

October

Gateway system has value-price of \$5,295.

1987

Shipping clerk/sales rep can't pronounce "peripherals." So we focus on systems and ship our first 286 PC for \$2,295.

September 1988

Gateway sells 386-20 PC for \$2,995, receives *Byte* magazine's Award of Distinction.

You've got a friend in

At Gateway 2000, we always keep our sights on your future, giving you the latest computer technology. To take full advantage of Microsoft® Windows® 95, you'll need a PC specifically designed for this new operating system. So, we gave it our all and built every Gateway 2000® PC to optimally run Windows 95. Continuing a tradition of industry firsts, Gateway announces new keyboards, designed with Windows 95 in mind, and 100% Windows Plug and Play compatibility on all Gateway systems! Plus, every professional desktop also includes the new MS Office 95, Professional Edition software suite.

Microsoft Windows 95

All Gateway 2000 PCs include

Microsoft Windows 95 and are optimized to take full advantage of this new operating system. A 32-bit multitasking architecture gives you stellar performance, and a new graphic interface makes using your new operating system a breeze. You'll also be prepared for tomorrow's technology advances with Windows 95's 32-bit platform.

Gateway 2000 also provides Windows 95 toll-free technical support including installation, configuration and problem resolution assistance for the life of your computer!

100% Plug and Play Compatible!

That's right. Gateway 2000 is the first company with 100% Windows Plug and Play compatibility across the line. Every Gateway PC is now optimized with Plug and Play BIOS, peripherals, and operating system. Configuring and expanding your system is now easier than ever, because Plug and Play automatically recognizes and configures any new expansion hardware installed in your PC. Plug and Play will keep your computer up to speed as your needs change and technology increases.

New Gateway 104+ Keyboard!

It's another industry first! All Gateway desktop PCs include the new AnyKey®+ or 104+ keyboard designed for your Windows 95 operating system. These keyboards include three new keys to work with Windows 95 — so you can easily switch between applications, launch programs and access files, and use shortcuts for the right-mouse button. As an added bonus, MS IntelliPoint and IntelliType software turns your mouse and keyboard into powerful, personalized computing tools. You'll love how the new AnyKey+ and 104+ keyboards and MS software complement the Windows 95 operating system.

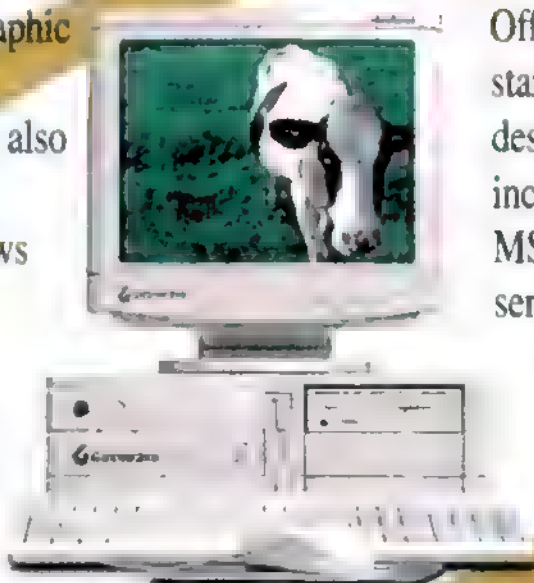
Optimized for Windows 95!

New Microsoft Office 95, Professional Edition

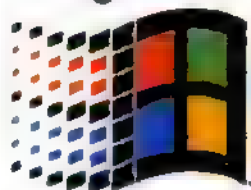
Another industry first, Microsoft Office 95, Professional Edition is standard on all Gateway professional desktop systems. This software suite includes the latest 32-bit versions of MS Word, Excel, PowerPoint® presentation graphics program and Schedule+, all on CD. Plus, you'll receive MS Access® database and Bookshelf® 95 on CD upon release from Microsoft later this year (\$10 shipping charge).

Specifically designed to take advantage of the powerful 32-bit Windows 95 operating system, Office 95 is loaded with great new enhancements. The Office Shortcut Bar gives you one-click access to all five office applications, and Office Binder lets you keep documents from all applications in one place. Office 95 upgrades are available through Gateway's Component Add-On Sales for all Gateway customers with any version of MS Office or MS Works — for just \$299.

Call Gateway 2000 today and get Windows 95 optimized!



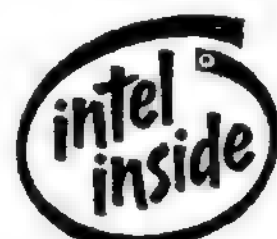
Designed for



Microsoft
Windows 95



8 0 0 - 8 4 6 - 2 0 6 3



pentium
PROCESSOR

The best place to buy a PC on the planet!



h 1992
nd Mike: "Now
ou sell us about a
on processors?"
'Umm ... OK."

y seven
old and
ly Microsoft
anufacturer
Year.

April 1993
Gateway named
a Fortune 500
company and
North Sioux City
gets its first 4-way
stop sign.



1993
Gateway offers first
Family PC multimedia
system for \$1,995.

March 1993
Gateway hires its 2000th employee.

April 1993
Gateway's one millionth PC
ships to Jerry Herak in
Spokane, Washington.

May 1993
Cow spots painted on
Gateway's North Sioux
City facility. Employees
wonder what's next.



August 1993
The ColorBook and HandBook
486 enter Gateway's stellar
product lineup.

May 1994
Gateway announces
three-year warranty on
desktop PCs and

July 1, 1994
Gateway
opens a
showroom in
Paris, France.

July 1994
CD-ROM drive
on all Gateways

September 1994
OK, now it's in
and Germany
foreign languages



Employees: 1,300

1992 Annual Sales: \$1.1 billion Employees: 1,850

1993 Annual Sales: \$1.7 billion Employees: 2,100

2
support
eue is
ne first
pany

October 1993
Gateway Europe sets
up shop in Dublin,
Ireland, marketing to
Ireland and the UK.

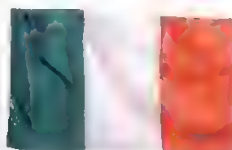


ible with our first
computers, includ-
dHandBook, the
first subnotebook.

1993
Gateway hires
second former
Sioux City mayor,
Jim Wharton.

December 1993
Gateway becomes
a public company.

November 1993
Another Gateway facility opens!
This time in Sioux Falls, SD.



September 1993
Gateway introduces first
VESA system.

October 1993
Gateway offers our first
Pentium system, the P5-60,
for \$3,595 and sweeps
Computer Shopper's Best
Buy awards for third
consecutive year.

October 1994
North Sioux City
welcomes the first
"golden arches"
of McDonalds.

November 1994
New Gateway
facility opens in
Kansas City.



Decem
The Lib
notebo
its deb

Decem
Gatew
"Feel



...ances a
...ranty for all
...nd monitors.



March 1995
Premier
issue of
GW2k:
Gateway
Magazine.

...es standard
...y systems

94
...eland, France
...Ted considers
...age lessons.

May 1995
Gateway's P5-120 is
named the "fastest PC
in the world," by
PC/Computing.



May 1995
Technical support completes
12,046 calls in one day! All
techs treated to sparkling cider
in plastic champagne glasses.

July 1995
Gateway ranks first among
Intel/Windows PC manu-
facturers in brand loyalty.

September 5, 1995
6,000 employees
worldwide cele-
brate Gateway's
10th Anniversary

September 6, 1995
Expansion must be
our middle name!
Plans announced
for Gateway Japan.



rees: 3,500 1994 Annual Sales: \$2.7 billion Employees: 4,500



ber 1994
...erty small
...ok makes
...out.

ber 1994
...ay's Holiday ad insert,
...Like A Kid Again" hits.

June 16, 1995
Gateway is first to offer
Windows 95 as a free
upgrade on all standard
configurations.

July 28, 1995
Gateway goes "down
under" to Australia.

August 1, 1995
Gateway Gold service
and support program
unveiled.

1996
North Sioux City
gets its first
traffic lights.

2015
Gateway continues its
dedication to bringing
all PC buyers the high-
est performance, tech-
nology and service —
all at the best value.

2020
"Hey Mike ... call me crazy,
but I think this whole computer
company idea is gonna fly."
Ted Waitt

We've always known our customers are the best. And now we have proof that Gateway 2000® has the most loyal customers in the entire Windows®-based PC industry!

Loyalty Unmatched

They've shown their allegiance by ranking us number one in brand loyalty in a new study from Computer Intelligence InfoCorp (CII). Among Windows PC manufacturers, Gateway 2000 ranked first in brand loyalty with an overall repurchase rate of 82%, 18 percentage points more than the nearest competitor! CII's annual Consumer Technology Index study is the largest, most comprehensive survey of PC usage in the U.S.

Why Gateway?

In 10 short years, Gateway 2000 has nurtured this customer loyalty by always keeping customer service and support our top priority. And by leading the industry in value and technology. We work hard to bring the right product to our

customers at the best prices along with performance unmatched by the competition.

Industry Firsts

Gateway 2000 has consistently brought PC buyers the very latest technology *before* the competition. Check out our timeline to see all Gateway's incredible industry firsts!

Unparalleled Service & Support

Our toll-free technical support representatives are fully trained to handle all your technical questions. Gateway's dedication to our customer doesn't end with the sale. We've

vowed to keep our cus-

tomers the happiest PC users in the world. And now all Gateway 2000 PCs come standard with Gateway Gold™!

Gateway Gold Service and Support

This new service and support program gives you all the support you need *when you need it.*

Gateway Gold Service & Support



GATEWAY GOLD

- Toll-Free Technical Support 24 Hours A Day, 7 Days A Week
- Free Software Technical Support for all Gateway-provided operating systems & applications (Includes Windows 95 Support)
- Industry-Leading Response Times For Toll-Free Support
- One-Year On-Site Service Agreement*
- Next Business Day Response On-Site Service†
- Scheduled On-Site Service (2-hour appointment window)
- Extended On-Site Service Hours (6am-10pm Monday-Friday, 8am-5pm Saturdays)
- Three-Year Limited Parts Warranty*
- Express Replacement Parts Delivery
- Club Gateway™ Membership
- GW2k™: Gateway Magazine — Gateway's quarterly publication
- Gateway Bulletin Board (BBS) Service
- Automated FaxBack Service

Be sure to ask about Gateway Gold Premium and À La Carte programs!

† Pending Parts Delivery

*Call or write us for a free copy of our on-site service agreement or three-year limited parts warranty.



"You've got a friend in the business."®

8 0 0 - 8 4 6 - 2 0 6 3



pentium
PROCESSOR



July 1992
Gateway's
"Race" ad hits.



March
Ted and
will yo
gazill
Intel:

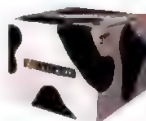
1992
Barely
years
alread
PC M
of the

1991
Gateway becomes first
company to win all four
Computer Shopper Best
Buy desktop awards.

January 1991
Ted and Mike: "Will
you sell us about a
gazillion processors?"
Intel: "Umm ... No."

April 1991
Gateway debuts
new cool gray
case design: mini
desktop model
and standard
AnyKey key-
board.

February 1991
Gateway is first to
introduce non-
interlaced monitors
on all systems.



April 1991
First cow-spotted
boxes ship!

February 1992
Customers rejoice!
Gateway begins
offering choice of
application
software with new
systems at no
extra charge.

1990
s to new
ious City,
yees are
Cs per day.

etting kind
er think of a
Gateway
've got a
business"



employees: 176 1990 Annual Sales: \$275.5 million Employees: 600 1991 Annual Sales: \$626.7 million Employees:

ation of North
reaches a
2,019.

1990
y's first 486
hits the market
iced at



May 1990
Microsoft Windows is now
standard on all Gateway
systems.



April 1991
Technical support
completes a
record number
2,800 calls in
one day!

1991
Inc. magazine proclaims
Gateway the fastest-growing
company in the nation.

July 1992
Gateway pours first
paved parking lot.
Employees throw
away hip waders.

March 1992
Technical s
holding qu
empty for th
time in com
history.

May 1992
Going mol
portable c
ing the Ha
industry's l

the business.



August 1991
Gateway's Robin Hood I ad hits.

It started as a dream, born on an Iowa farm. Today, 10 years later, the same company that once clocked in by a rooster crow is recognized as the nation's PC industry leader. The Gateway 2000® secret? Give PC buyers a quality product, the latest technology, and incomparable service — all at an unparalleled value. Our hard-working employees know what it takes to get the job done right. And we're ready to outdo ourselves in the next decade and beyond.

In an industry where change is the only constant, Gateway 2000 is proud of our loyal customers. How are we thanking them for 10 years of success? We asked our neighborhood Hallmark store, and they said, "10th anniversary gift? Why, traditionally that's tin!"

So, we threw that around for awhile, then

worked with our suppliers to bring you an incredible price on an extra-special, limited quantity computer: the system of systems, the granddaddy of them all...

Gateway's 10th Anniversary System

Introducing the Gateway 2000 10th Anniversary System!

It's everything

Gateway is famous for: industry-leading product introductions,

ultimate performance and incomparable value!

Designed with the computer connoisseur in mind, this limited edition, standard configuration comes in new tower case sporting our 10th Anniversary insignia and houses a 133MHz Intel® Pentium® processor, 16MB EDO memory, and 17-inch Vivitron™ color monitor.

As well as *these* industry firsts!

6X EIDE CD-ROM Drive

That's right! Gateway 2000 is the *first* to announce the new blazing 6X CD-ROM drive, standard on our 10th Anniversary System. It's the fastest EIDE CD-ROM *anywhere*. Combined with a Matrox® MGA

VRAM graphics accelerator, you get 3-D graphics, smooth full-motion video, and you're primed for video scaling applications including MPEG and video conferencing.

New AnyKey+ Keyboard

Another industry first, the Anniversary System includes our programmable AnyKey+ keyboard for complete functionality with the Windows 95 operating system. It includes three keys specifically designed to take advantage of Windows 95 features.

Gateway Exclusive Sound System!

Our 10th Anniversary System includes *the first* speaker system designed to create theater-type

surround sound for the multimedia computer

environment! Two Altec™ Lansing Surround Sound 1.5-foot tower satellite speakers and a 40-watt subwoofer give you high-fidelity stereo sound

for all your multimedia applications and music CDs.

10th Anniversary Software

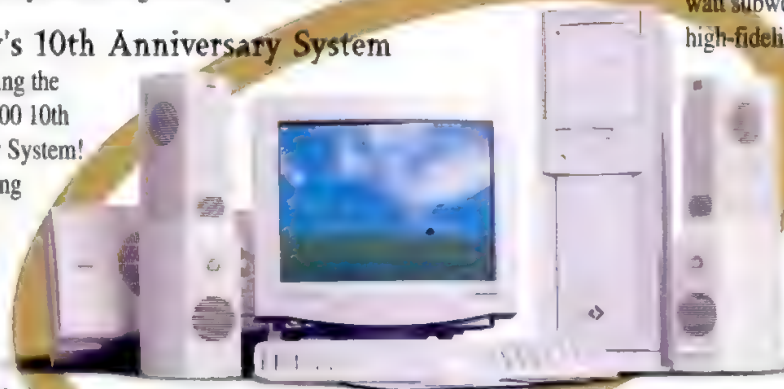
The Anniversary

software bundle includes

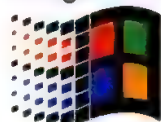
Microsoft Office 95, Professional Edition and Gateway's Generations Collection for over 56 of the most popular software applications. You won't find a more complete software package anywhere else!

Celebrate a decade of incredible PC values and order your Gateway 2000 10th Anniversary System today! Order *any* Gateway system and enjoy our commemorative 10th Anniversary mouse pad!

The 10th Anniversary System



Designed for



Microsoft
Windows 95



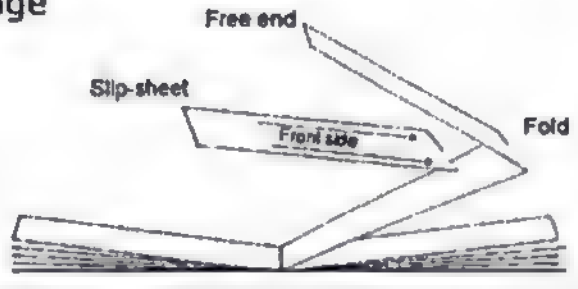
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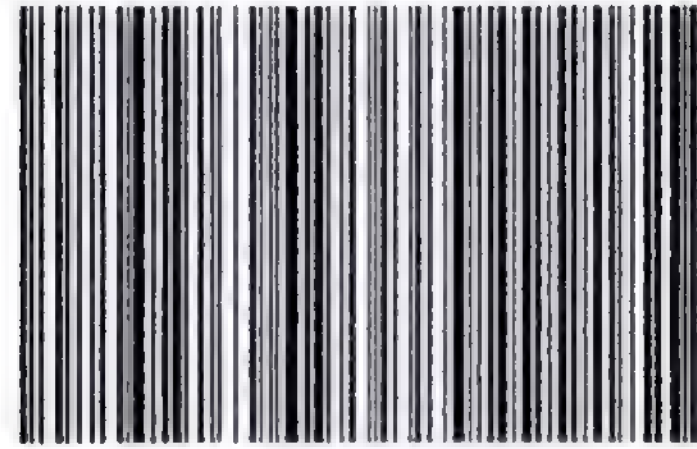
pentium
PROCESSOR

Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



Inverted Foldout slip-sheet

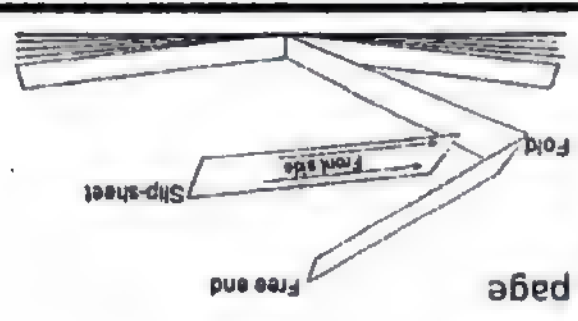


GbsSlipSheet-001

Folded edge of the page

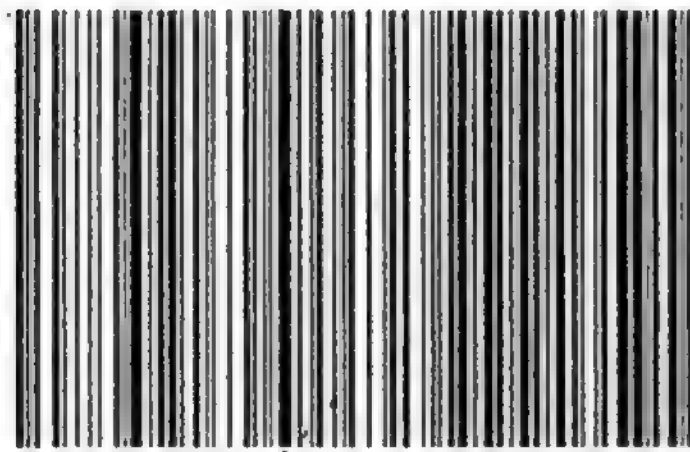
Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



1. Follow instructions on the other side

Inverted Back

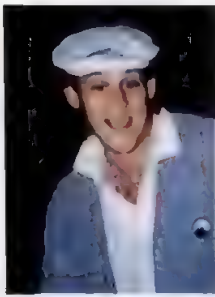


GbsSlpBack-0018

Back

1. Follow instructions on the other side

We are Gateway 2000.



August 1985
"Hey, Mike ...
call me crazy
but I've had
this craving all
day to start a
computer
company!"
Ted Waitt

September 5, 1985
Congratulations, it's a computer
company! Gateway 2000 is born at
the Waitt Family Cattle Farm
outside Sioux City, Iowa.



August 1985
Ted's grandma, "Momo," takes
a leap of faith and becomes
Gateway's first principal investor,
securing a \$10,000 loan.

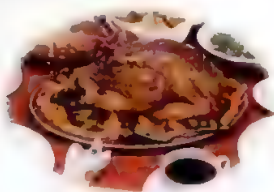


April 2, 1986
The Livestock Exchange
at the Sioux City Stock
Gateway's first home
home.

April 3, 1986
UPS man gets stuck in
tor for the first of many
Begins thinking of stair
alternative.



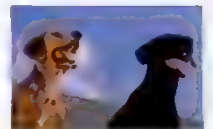
November 1985
Ted springs for
Thanksgiving
dinner for entire
Gateway
workforce (Mike
Hammond).



1986
North Sioux City,
South Dakota, gets a
water tower.



May 1986
Bunky & Jake fight a losing
battle for company mascot
honors. (The cow won.)



August 3, 1986
Shipping clerk covers for
Ted over lunch and
becomes Gateway's first
sales rep.

1986
Gateway 2000 ships its first PC.

• We will always be happy, but we will never be satisfied.

Gateway 2000® Family PC™ Systems

P5-75 FAMILY PC

- Intel® 75MHz Pentium® Processor
- 8MB RAM
- 540MB 11ms EIDE Hard Drive
- PCI Enhanced IDE Interface
- 32-Bit PCI Graphics Accelerator w/ 1MB DRAM
- 4X CD-ROM, 16-Bit Sound Card & Altec™ ACS-5 Speakers
- TelePath® 14.4 Fax/Modem Communication Center
- 3.5" Diskette Drive
- 15" .28dp CrystalScan® Monitor
- 7-Bay Desktop Case
- New 104+ Keyboard
- MS Mouse 2.0
- Microsoft® Windows® 95
- Generations Software Collection
- Gateway Gold™ Service & Support

\$1899

P5-100 FAMILY PC

- Intel 100MHz Pentium Processor
- 8MB EDO Performance-Enhanced Memory
- 1GB 9ms Mode 4 EIDE Hard Drive
- PCI Enhanced IDE Interface
- 64-Bit PCI Graphics Accelerator w/ 2MB DRAM
- 4X CD-ROM, 16-Bit Sound Card & Altec ACS-5 Speakers
- TelePath 28.8 Fax/Modem Communication Center
- 3.5" Diskette Drive
- 15" .26dp Vivitron™ Color Monitor
- 7-Bay Desktop Case
- New 104+ Keyboard
- MS Mouse 2.0
- MS Windows 95
- Generations Software Collection
- Gateway Gold Service & Support

\$2399

P5-120 FAMILY PC

- Intel 120MHz Pentium Processor
- 8MB EDO Performance-Enhanced Memory
- 1GB 9ms Mode 4 EIDE Hard Drive
- PCI Enhanced IDE Interface
- 64-Bit PCI Graphics Accelerator w/ 2MB DRAM
- 4X CD-ROM, 16-Bit Sound Card & Altec ACS-5 Speakers
- TelePath 28.8 Fax/Modem Communication Center
- 3.5" Diskette Drive
- 17" .26dp Vivitron Color Monitor
- 7-Bay Desktop Case
- New 104+ Keyboard
- MS Mouse 2.0
- MS Windows 95
- Generations Software Collection
- Gateway Gold Service & Support

\$2999



SOFTWARE COLLECTION

- Microsoft® Encarta® '95 • MS Bob™
- MS Money 3.0 • MS Works 3.0 • MS Publisher 2.0 • MS Publisher Design Pack • MS Cinemania® '95 • MS Bookshelf® '95 • MS Composer Collection: Beethoven, Mozart and Schubert • MS Wine • MS Arcade: Missile Command™, Asteroids, Tempest™, Centipede® and Battlezone™ • MS Dinosaurs • Mayo Clinic® Family Health Book • and Mayo Clinic Family Pharmacist • plus 31 popular MS entertainment games.

All Gateway 2000 systems are ISO 9002 Certified for quality assurance.



Professional Systems

- Intel 75MHz Pentium Processor
- 8MB RAM
- 540MB 11ms EIDE Hard Drive
- PCI Enhanced IDE Interface
- 32-Bit PCI Graphics Accelerator w/ 1MB DRAM
- 4X CD-ROM Drive
- 3.5" Diskette Drive
- 14" .28dp CrystalScan Color Monitor
- 7-Bay Desktop Case
- New 104+ Keyboard
- MS Mouse 2.0
- MS Windows 95
- MS Works 95
- Gateway Gold Service & Support

\$1599

- Intel 100MHz Pentium Processor
- 8MB EDO Performance-Enhanced Memory
- 730MB 10ms EIDE Hard Drive
- PCI Enhanced IDE Interface
- 32-Bit PCI Graphics Accelerator w/ 1MB DRAM
- 4X CD-ROM Drive
- 3.5" Diskette Drive
- 15" .28dp CrystalScan Color Monitor
- 7-Bay Desktop Case
- New 104+ Keyboard
- MS Mouse 2.0
- MS Windows 95
- MS Office 95, Professional Edition* with Bookshelf '95
- Gateway Gold Service & Support

P5-100 \$1999
P5-90 \$1899

- Intel 120MHz Pentium Processor
- 16MB EDO Performance-Enhanced Memory
- 256K Pipelined Burst Cache
- 1GB 9ms Mode 4 EIDE Hard Drive
- PCI Enhanced IDE Interface
- 32-Bit PCI Graphics Accelerator w/ 1MB DRAM
- 4X CD-ROM Drive
- 3.5" Diskette Drive
- 15" .28dp CrystalScan Color Monitor
- 7-Bay Desktop Case
- New 104+ Keyboard
- MS Mouse 2.0
- MS Windows 95
- MS Office 95, Professional Edition* with Bookshelf '95
- Gateway Gold Service & Support

\$2699

- Intel 133MHz Pentium Processor
- 16MB EDO Performance-Enhanced Memory
- 256K Pipelined Burst Cache
- 1GB 9ms Mode 4 EIDE Hard Drive
- PCI Enhanced IDE Interface
- 64-Bit PCI Graphics Accelerator w/ 2MB DRAM
- 4X CD-ROM Drive
- 3.5" Diskette Drive
- 15" .26dp Vivitron Color Monitor
- 9-Bay Tower Case
- New 104+ Keyboard
- MS Mouse 2.0
- MS Windows 95
- MS Office 95, Professional Edition* with Bookshelf '95
- Gateway Gold Service & Support

\$2999

10th ANNIVERSARY SYSTEM

- Intel 133MHz Pentium Processor
- 16MB EDO Performance-Enhanced Memory
- 256K Pipelined Burst Cache
- 1.62GB 9ms EIDE Mode 4 Hard Drive
- PCI Enhanced IDE Interface
- Matrox® MGA™ Millennium™ 2MB WRAM Graphics Accelerator
- 6X EIDE CD-ROM Drive
- 16-Bit Ensoniq® Wavetable Sound Card & Altec™ Lansing Surround Sound Speakers w/ Subwoofer
- TelePath 28.8 Fax/Modem Communication Center
- 3.5" Diskette Drive
- 17" .26dp Vivitron Color Monitor
- 9-Bay Tower Case
- New AnyKey® Keyboard
- MS Mouse 2.0
- MS Windows 95
- 10th Anniversary System Software Collection: MS Office 95, Professional Edition* with Bookshelf '95 and Generations.
- Gateway Gold Premium Service

\$3999

- Service When You Need It**
- Toll-Free Technical Support 24 Hours A Day, 7 Days A Week
- Free Software Technical Support for all Gateway-provided operating systems & applications (includes Windows 95 Support)
- Industry-Leading Response Times For Toll-Free Support
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- Next Business Day Response On-Site Service†

- Extended On-Site Service Hours (6am-10pm Monday-Friday, 8am-5pm Saturdays)
- Scheduled On-Site Service (2-hour appointment window)
- 3-Year Limited Parts Warranty
- Express Replacement Parts Delivery
- Club Gateway™ Membership
- GW2k™: Gateway Magazine
- Gateway Bulletin Board (BBS) Service
- Automated FaxBack Service

†Pending parts delivery.

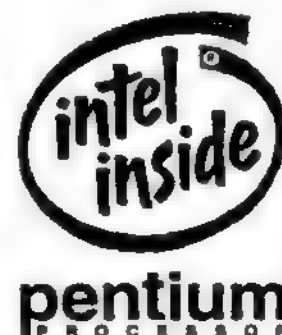
*MS Office 95, Professional Edition includes MS Word, Excel, PowerPoint® presentation graphics program, and Access® database (\$10 shipping charge).

GSA Schedule # GS-00K-94-AGS-5150-PS01



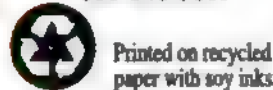
8 0 0 - 8 4 6 - 2 0 6 3

All Pentium PCs feature the ultra-fast Triton chip set and Plug and Play BIOS.



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- On-Site Upgrade/Add-On Installation
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TelePath® 28.8 Fax/Modem Communication Center

Internal fax/modem, 28,800bps modem, V.34, with 28,800bps fax capability. Sends and receives data and faxes, and also includes full voice mail capabilities. Includes trial memberships to CompuServe®, AOL and Prodigy®. **\$149** (TelePath 14.4 Fax/Modem \$79)

Colorado Memory Systems® Jumbo™ 1400 TBU

CMS Jumbo 1400 internal tape backup unit with up to 1.36GB compressed (680MB native) storage capacity per tape. Comes with MS Windows® and DOS® software, one tape and cable. **\$199**

Multimedia

4X Three-CD Changer

Enhance the value and usefulness of your PC with the 4X three-CD changer. It supports multisession photo CDs and XA format, enabling simultaneous audio and data with additional hardware. You'll have access to three times the amount of information of a regular CD-ROM drive. **\$125** (upgrade from 4X CD-ROM)

Wavetable Audio Multimedia Kit

Once you've heard wavetable audio, basic audio will never do!

- Ensoniq® Soundscape™ 16-bit wavetable sound card, MT-32 and FM mode compatible. Supports most software for popular sound cards and standards including General MIDI, Sound Blaster™, AdLib, Roland MPU 401, MS Windows Sound System and MT 32
 - New Altec™ Lansing ACS-31 three-piece speaker system
 - Blue Ribbon Sound Works' SuperJAM! jr. software
- \$209** (with system purchase)
\$110 (upgrade from systems with 16-bit sound card and Altec speakers)

Networking

3Com® Ethernet Adapters

High-performance 16-bit Ethernet cards.

- 16-bit Triple Media Card with BNC, AUI and RJ-45 connectors **\$109**
- 16-bit Card with only RJ-45 connector **\$89**

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32-bit card with both RJ-45 and BNC connectors **\$139**



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No Payment" Program!

Gateway accepts most major credit cards and C.O.D. terms, with net 30-day terms and leasing options available to qualified commercial customers. You can also apply for the Gateway 2000 DuoLine™ MasterCard® card, issued by Dial National Bank, Des Moines, Iowa.



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Non-interlaced color monitor using Sony® Trinitron® tube technology, capable of 1280 x 1024 resolution.

Gateway 15-Inch Vivitron Color Monitor, .26 dot pitch

Upgrade from a 14" CrystalScan® to 15" Vivitron monitor **\$140**

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Upgrade from a 15" CrystalScan to 17" Vivitron monitor **\$340**

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(Upgrade prices good only at time of system purchase.)

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New Windows® 95 Upgrade

Only available to our valued customers! Windows 95 will make your system faster and easier to use. Order your copy today! **\$99** (On diskettes \$109)

New Starter Pack: the Sequel

A new twist on our favorite software bundle! Includes Tuneland™, Cyberia™, Rand McNally TripMaker™, 70 Million Households Phone Book, Hometime® Weekend Home Projects, Consumer Survival Kit, and The 7th Guest™. **\$99**

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Includes TFX™: Tactical Fighter Experiment, Aces Over Europe, Maximum Comanche®, Strike Commander, Privateer, Wing Commander™ Armada, and Warplanes. You also get a joystick and 20-disc storage rack. **\$99**

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Epson® Stylus™ IIS Color Ink Jet Printer

Photo quality printing in color and black & white. Easy-to-use drivers are compatible with virtually all MS applications. Includes parallel cable. **\$339**

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Features a high-performance RISC-based processor optimized to perform operations in fewer clock cycles than a standard CISC, as well as 600 x 600dpi with edge smoothing technology. Includes parallel cable. **\$499**

Call for more printer options, including Hewlett-Packard printers!



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Call the Gateway 2000 special component add-ons division at 800-846-2063 for our complete line of extras for Gateway customers. Sales hours: 7am-10pm Weekdays.

as Internet classics such as Internet Relay Chat, finger, and Traceroute. But compared with offerings from America Online and Prodigy, Delphi's mostly text-based interface looks truly ancient and is not well suited for beginners.

By the time you read this story, Delphi plans to have launched a brand-new Internet-based service—a joint venture with MCI Communications Corp.—that will include a tailored version of the Netscape Web browser. Currently, access is available nationwide at 14.4 Kbps, and Delphi says it is steadily upgrading to 28.8 Kbps. You can get a small taste of what Delphi has in store for its new, graphical era by visiting its home page at www.delphi.com. It includes a list of assorted Web hot spots, most of which are entertainment oriented.

Delphi's new InterNav 1.2 software—available via downloading from Delphi or via mail from Delphi's member services—is Windows based, but the GUI ends after you click on a button labeled Internet. From then on you're using arcane Unix commands for navigation. Just about everything, right down to the stark mail interface, recalls the days of using ye olde VAX terminal for Internet access. And Delphi's voluminous documentation does not make the journey any less intimidating.

Internet services are grouped conveniently under the Internet SIG (special interest group) menu. The opening screen offers a host of options, including Gopher, FTP, and Usenet newsgroups, plus information on Delphi's Internet features and forums for general discussion about the Internet. Internet e-mail, which is extremely simple to use, is conveniently located with the other Internet options.

Delphi, like AOL and Prodigy, offers good integration with Internet content: Usenet newsgroups and Web sites appear as menu options alongside Delphi's own special-interest forums.

Delphi's text-only Web access is a throwback to the old, pre-Mosaic days. You enter the Gopher menu to use

Gopher or the Web. You then navigate the Web by jumping directly to a Web page after entering a URL or by using one of the fairly extensive hotlist menus. Organized by subject, the hotlists can take you straight to a Web site but do not display the site's URL.

The Usenet newsreader is straightforward and functional, reminiscent of what you might see on an advanced bulletin board system. You can search lists of newsgroups or for the newsgroup of your choice from Delphi's list.

Delphi's rates, while not much less than CompuServe's

Internet Club pricing, are reasonable if you go with the 20/20 plan: \$20 for 20 hours and \$1.80 for each additional hour. There is a \$9-per-hour surcharge from 6 A.M. to 6 P.M., local time, on weekdays.

Delphi's strength is its complete range of Internet utilities. But if you think of Delphi as the Internet's equivalent of an oldies station, stay tuned: It will soon be changing its format to Top 40.

GE Information Systems Inc.

GENie Online Services

BY PADRAIC BOYLE

GENie recently added Internet access and a brand-new Windows front end to its array of services. Like Delphi, however, GENie has no graphical tools once you're on the Internet, and World-Wide Web access is text-based. And while GENie charges just \$8.95 per month (which includes 4 hours), abundant surcharges can make GENie much more expensive than other on-line services. In all, when it comes to Internet access, GENie has some maturing to do.

The new GENie for Windows, Version 2.0, which is easy to install, provides a desktop with friendly icons that allow for easy navigation through GENie's available services, in-

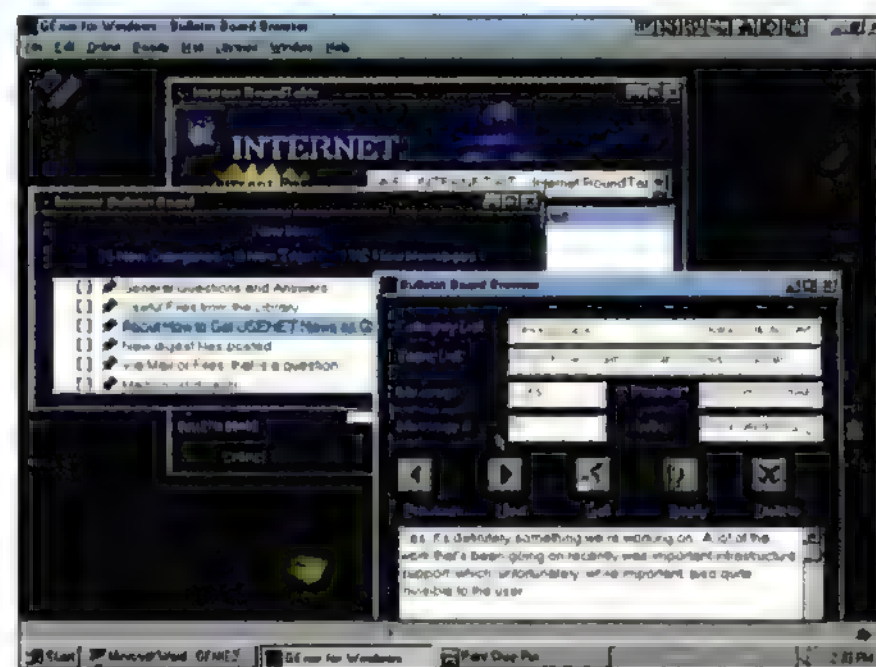
cluding an icon for entering the Internet. After you enter the Internet, however, the warm welcome and familiar icons disappear.

Once you have entered into the Internet area of GENie, a Windows terminal screen pops up and connects you to GENie's text-based Unix menus, which offer access to FTP, Gopher, telnet, and Usenet newsgroups as well as archie and Veronica to search FTP and Gopher sites. The menus aren't terribly difficult to navigate, but the overall impact of being on the Web doesn't match that of Mosaic-like Web browsers.

GENie offers direct access to Usenet newsgroups through Gopher, Links, or telnet, but if you don't know the complete name of the group you want to access, you need to search for it by typing News: and a topic. There is some additional access to newsgroups via GENie's discussion forums, called Roundtables.

GENie teaches users how to access its Internet service through on-line tips, bulletin boards, Roundtable discussions, and Internet education courses (which you reach by typing Internet 101 at any prompt). Sending e-mail to users on the Internet is easy, thanks to GENie's versatile address book. To send a message to a user on another on-line service, all you have to do is click a button with the service name and type in the recipient's service user ID. You can store the name in the address book for future use.

According to the company, access to GENie is available nationwide at 14.4 Kbps. GENie also still offers its DOS-



GENie Online Services offers help to new Internet users through bulletin boards, Roundtable discussions, and on-line Internet education courses.

You're ready to make the move to Microsoft's new 32-bit Windows 95 operating system. The most powerful PC operating system you've

ever experienced. But before you do,

background, monitoring your system and automatically launching tools to maintain system performance and prevent system crashes.

Of course, if your system does

Norton Utilities for Windows 95 keeps running to help you recover. That's the beauty of our native, 32-bit utilities.

No other utilities can

give you this kind of

NORTON UTILITIES PROVIDES THE ONLY AUTOMATIC DATA RECOVERY AND CONTINUOUS SYSTEM PROTECTION FOR WINDOWS 95.

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IT'S A 32-BIT WORLD OUT THERE.

You already know Norton Utilities is the best set of tools for system protection, hard disk optimization and data recovery.

What you may not realize is that your current 16-bit utilities won't run under Windows 95.

And the simple utilities found in Windows 95 itself don't offer sufficient data protection for life in a 32-bit world.

Which is why you need the new Norton Utilities for Windows 95.

The first thing Norton Utilities for Windows 95 will do for you is tune up your system for Windows 95 by optimizing your hard drive and cleaning out all of the files you no longer need.

Then Norton Utilities runs in the

background, monitoring your system and automatically launching tools to maintain system performance and prevent system crashes. Of course, if your system does

crash or you accidentally erase a file, Norton Utilities for Windows 95 gives you the data recovery tools users have relied on from day one.

NORTON UTILITIES FOR WINDOWS 95

PRE-INSTALLATION TUNE-UP

Frees up disk space and provides a comprehensive pre-installation physical.

NORTON SYSTEM DOCTOR

Continuously monitors all vital resources and data integrity. Alerts you to impending disaster and recommends action or fixes problems automatically.

NORTON DISK DOCTOR®

Automatically diagnoses and repairs file system problems using the speed and safety of 32-bit technology.

UNERASE®

100% protection of erased files. The new wizard-like interface leads you through file recovery step by step.

SYSTEM INFORMATION

Diagnoses potential conflicts and configuration problems with detailed system information and performance testing.

NORTON SPEED DISK™

Automatically optimizes drive and reduces future fragmentation using 32-bit technology.



continuous, real-time protection and data recovery in the brave new world of Windows 95.

PROTECT YOUR DATA FROM DAY ONE.

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So you've got nothing to lose. Except your data. Get your trade-up edition of Norton Utilities for Windows 95 today.

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CIRCLE 374 ON READER SERVICE CARD

SUMMARY OF FEATURES

Commercial On-Line Services

■ YES ■ NO

Services listed in alphabetical order



CompuServe
Information
Service

America Online

Delphi Internet

Genie Online
Services

The Microsoft
Network

Prodigy

Company	America Online Inc.	CompuServe Inc.	Delphi Internet Services Corp.	GE Information Services Inc.	Microsoft Corp.	Prodigy Services Co.
Address	8619 Westwood Center Dr., Vienna, VA 22182	5000 Arlington Centre Blvd., P.O. Box 20212, Columbus, OH 43220	620 Avenue of the Americas, New York, NY 10011	401 N. Washington St., Rockville, MD 20850	One Microsoft Way, Redmond, WA 98052	445 Hamilton Ave., White Plains, NY 10601
Phone number	800-827-6364	800-848-8199	508-323-1000	800-638-9636	206-882-8080	914-448-8000
Fax number	703-448-0760	None	508-323-2922	301-251-6421	206-936-7329	None
E-mail address	info@aol.com	70006,101@compuserve.com	askdelphi@delphi.com	feedback@genie.com	info@msn.com	freetrial@prodigy.com
World-Wide Web address	www.aol.com	www.compuserve.com	www.delphi.com	www.genie.com	www.msn.com	www.prodigy.com
Maximum connection speed	28.8 Kbps	28.8 Kbps	14.4 Kbps	14.4 Kbps	28.8 Kbps	14.4 Kbps
Points of presence (estimated)	166 ¹	420	None ²	More than 600	Info not available ³	325
ISDN	None	None	None	None	All	4
28.8 Kbps	166	16 cities	None	None	All	10
14.4 Kbps	All	300 cities	All	All	All	All
9.6 Kbps	All	All	All	All	All	All
Dial-up access	■	■	■	■	■	■
Direct TCP/IP connections	■	■	■ (Boston area only)	■	■	■
Leased-line connections	■	■	■	■	■	■
800-number access	■	■	■	■	■	■
Software:						
Proprietary	America Online	NetLauncher	InterNav	Genie for Windows	Internet Explorer	Prodigy
Standard TCP/IP stack	■	■	■	■	■	■
Service Rates						
Monthly fee	\$9.95	\$9.95 (basic)	\$20	\$8.95	\$19.95 (Frequent User Monthly Plan)	\$9.95
Hours included	5	5	20	4	20	5
Additional hourly fee when user exceeds limit	\$2.95	\$2.95 (basic)	\$1.80	\$3.00	\$2.00	\$2.95
Setup fee	None	None	\$19.00	None	N/A*	None
Fee for one month of Web, e-mail, and Usenet service (20 hours)	\$54.20	\$24.95	\$20.00	\$83.50 (minimum)	\$19.95	\$30.00
Search Tools and Web Services						
archie/FTP	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Finger/PING	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Gopher/Veronica	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
telnet/rlogin	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Web	■	■	■ (text only)	■ (text only)	■	■
Web-page construction/hosting	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Server storage included with Web account	■	■	■	N/A**	N/A**	■
Mail robots	■	■	■	N/A**	N/A**	■
Technical Support						
Fee	None	None	None	None	None	None
On-line support	■	■	■	■	■	■
E-mail support	■	■	■	■	■	■
Phone support	■	■	■	■	■	■
Support via Usenet	■	■	■	■	■	■
Technical-support hours (eastern time)	24 hours, 7 days	7:00 A.M.–2:00 A.M M–F; 12:00 noon–10:00 P.M. Sat., Sun.	24 hours, 7-days	9:00 A.M.–12:00 midnight M–F; 12:00 noon–10:00 P.M Sat., Sun	7:00 A.M.–2:00 A.M M–F; 12:00 noon–10:00 P.M. Sat., Sun.	24 hours, 7 days
User training	■	■	■	■	■	■

¹ America Online users can also connect via SprintNet

² Delphi users can access the service through SprintNet and Tymnet

N/A*—Not applicable: Microsoft Network is available only through the purchase of Windows 95

N/A**—Not applicable: The product does not have this feature.

Windows 95 is here. And it's really terrific.

Except for one thing: it doesn't include any anti-virus protection. And your old anti-virus software won't work in Windows 95 either. But thousands of old viruses will.

So that leaves you with a choice. Do nothing and hope you never come across an infected floppy or download an infected file. Or buy a new anti-virus software product that

from the viruses everybody already knows about. But also from the new viruses created every day.

What's more, you get all this ironclad



DETECTION, PREVENTION, DESTRUCTION. IF YOUR ANTI-VIRUS SOFTWARE DOESN'T HAVE ALL THREE, YOU'LL BE COMPLETELY EXPOSED TO VIRUSES IN WINDOWS 95.

can work in this new environment.

But which anti-virus product should you buy? Norton AntiVirus® for Windows 95.

NCSA CERTIFIED SO YOU CAN REST EASY.

Norton AntiVirus for Windows 95 is certified by the National Computer Security Association. And recent independent tests* conclusively demonstrate that Norton AntiVirus for Windows 95 detects and destroys as many or more known viruses as any other anti-virus product around.

But our virus protection doesn't stop there.

Norton AntiVirus for Windows 95 also protects you from new, unknown viruses. Thanks to a unique virus detection technology that allows us to spot any suspicious activity, no matter where it's lurking.

So your system is safe. Not just

protection without a host of long annoying disruptions to your work.

Because Norton AntiVirus for Windows 95 scans files fast. Even compressed files.

And Norton AntiVirus works in the background, continuously monitoring file access and usage. So it can stop viruses in their tracks. Which means you don't have to

worry every time you put a floppy in your disk drive.

THE NO RISK ANTI-VIRUS SOLUTION.

Needless to say, Norton AntiVirus for Windows 95 comes with our standard sixty-day money-back guarantee.

So why gamble on running Windows 95 without all the virus protection you can get. Get your trade-up edition of Norton AntiVirus for Windows 95 today.

TRADE-UP EDITION NOW ON SALE.

.....
• If you own Norton AntiVirus, Central Point Anti-Virus, Norton Desktop for Windows, or PC Tools, get your \$29.95 made-up edition** of Norton AntiVirus for Windows 95 today. McAfee VirusScan and Dr. Solomon's Anti-Virus owners also eligible. To purchase, visit your software store or call us at 1-800-450-9760 ext. 9173.
.....



NORTON ANTIVIRUS FOR WINDOWS 95

WINDOWS 95 COMPLIANT
Full 32-bit application. Supports long file names and Universal Naming Conventions.

**AUTOMATIC
BACKGROUND MONITORING**
Virtual device driver unobtrusively checks for viruses in the background. Ensures backups and files transferred are virus-free.

FAST SCANNING
Provides ironclad virus protection without affecting productivity. Scan even compressed files fast.

EXCLUSIVE VIRUS SENSOR
Provides continuous, transparent protection against new, unknown viruses.



SYMANTEC.

*Test conducted by NCSA and Patricia M. Hoffman/VSU/IL, Aug. 1995. **Trade-up edition will run only where specified Symantec, Central Point, McAfee or Dr. Solomon's products are already installed. Check with your software store for qualifying versions. Price does not include shipping & handling or any applicable sales tax. Symantec and Norton AntiVirus are registered trademarks of Symantec Corp. All other brand names or trademarks are the property of their respective owners. ©1995 Symantec Corp. All rights reserved. Visit us on the Internet at <http://www.symantec.com>. In Canada, call 1-800-965-0641. In Australia, call 2-879-6577. In Europe, call 31-71-553111.

CIRCLE 375 ON READER SERVICE CARD

based Aladdin front end for those who want advanced scripting options and really don't need a graphical interface.

On-line surcharges for GENie are massive compared with other services reviewed here, although Delphi's charges were also pretty hefty. According to GENie's pricing plan at press time, you could end up spending \$15 per hour for text-based Internet access. After the four free hours included in the monthly fee (\$8.95), additional hours cost \$3 per hour. Add to that a \$2 per hour prime time surcharge (weekdays, 8 A.M. to 6 P.M. local time) and a staggering \$6 per hour surcharge for 9.6 Kbps or faster connection speeds.

Although GENie's forage into the waters of the Internet is incomplete compared with those of other on-line services, it does bring its users one step closer to the rest of the Net.

Microsoft Corp.

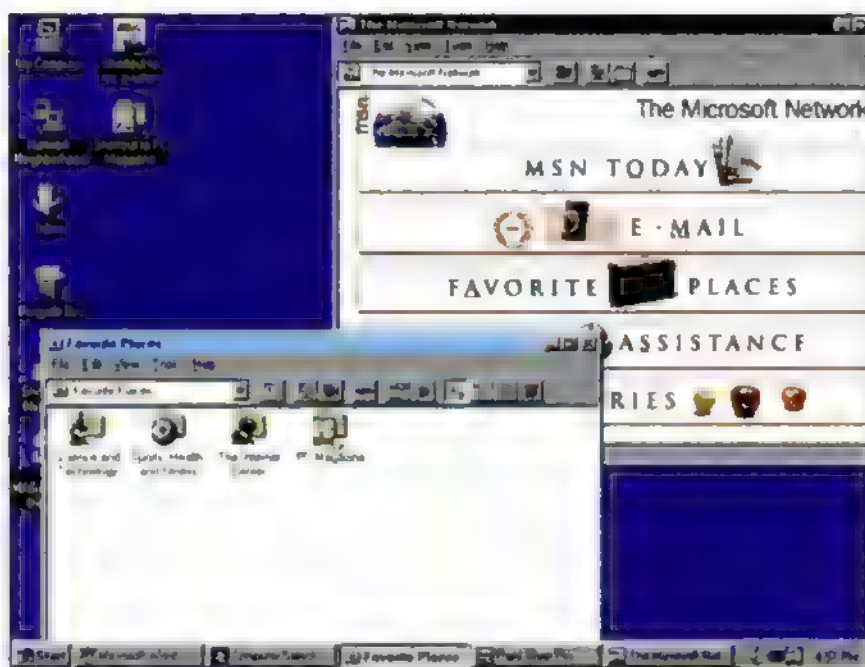
The Microsoft Network

BY PADRAIC BOYLE

Scheduled to ship as part of Windows 95, The Microsoft Network (MSN) provides many of the same powerful Internet-access features found in America Online and Prodigy, including an integrated Web browser, Usenet newsgroups, FTP, and e-mail. MSN also offers easy navigation via user-created links and Windows 95's object-oriented interface and has begun to integrate Internet offerings with its own. We looked at the final code for Windows 95, but MSN was still not totally finished, nor was its Web page.

Currently, you can access MSN only if you have Windows 95 installed on your system. Pricing for MSN will range from \$4.95 per month to \$49.95 per year for 3 hours' monthly use, plus \$2.50 for each additional hour (see the sidebar "The Microsoft Network's Big Debut"). Most newly purchased PCs will come with the Internet software already installed as part of Windows 95, while buyers of Windows 95 upgrades will have to download the Internet software from MSN or purchase the Microsoft Plus! CD-ROM for \$49.99. A Windows NT version is due later this year, and a Macintosh version is planned for the summer of 1996.

To access the Internet, you simply click on the button entitled Categories on



The Microsoft Network lets you collect all your favorite services, including the Internet Explorer, in a Favorite Places window.

MSN's opening screen. You then get a list of subject categories, such as Arts and Entertainment; Sports, Fitness, and Recreation; and Business and Finance, as well as the Internet Center. Clicking on Internet Center opens a screen where you can download Internet Explorer (MSN's Web browser), access Usenet newsgroups, chat about the Internet with other MSN users, read about Netiquette, or download files that discuss various aspects of the Net.

The Internet Explorer lets you access the World-Wide Web, FTP, Gopher, telnet, and Usenet newsgroups. Based on NCSA Mosaic, it has all the basic features found in Netscape, including the ability to add favorite Web sites to a pull-down menu.

For those who already have a favorite Winsock-compatible Web browser or utility, such as Netscape, you can substitute them in place of MSN's.

From MSN's home page you can read about MSN's Internet Explorer or go directly to surfing the Net from a list of popular Web sites. You can also do searches of Web sites by topic using Lycos. Microsoft says that the MSN home page will change over time and that it may be completely different by the time you read this.

One particularly useful feature of MSN is the ability to create your own links, called shortcuts, to your favorite Internet sites. You can store these links as icons just about anywhere, including the Windows 95 desktop; clicking on a Web site icon launches the Internet Explorer and takes you directly to that site. Shortcuts support OLE 2.0 and can be embed-

ded into any e-mail message or Windows 95 document.

MSN provides access to Usenet newsgroups as a component of the on-line service's bulletin boards. When we looked at the service, newsgroups were already listed under the same subject categories as MSN's bulletin boards. Microsoft claims that Web sites will also be integrated under subject categories with MSN's own offerings. At the time of this writing, you could not post messages in the newsgroups. Microsoft claims it will offer full access by the release date.

Connections to MSN will be available from 9.6-Kbps to ISDN speeds covering a majority of North America when the on-line service goes live in August, according to Microsoft.

Some users will undoubtedly find it disconcerting that they'll have to upgrade to Windows 95 before they can even take a look at MSN. But they may also be pleasantly surprised at the services and Internet access that MSN offers.

Prodigy Services Co.

Prodigy

BY MELISSA J. PERENSON

Prodigy was the first on-line service out the gate with a Web browser, and it remains an affordable, user-friendly service with powerful Internet access. Prodigy's long-awaited new interface, introduced in August, is much improved and does a great job of integrating Internet offerings with its own. And Prodigy's 30/30 plan (30 hours of use for \$30) is an excellent deal.

Prodigy's Internet access, while good, is not as well rounded as AOL's: It focuses on the World-Wide Web, Usenet newsgroups, and Internet e-mail, with Gopher and FTP offered only via the Web browser. And according to Prodigy, nationwide access will be limited to 14.4 Kbps until late 1995; AOL already offers 28.8-Kbps access.

When starting Prodigy, you have your choice of paths to the Internet. Before you even dial up the service, the sign-on screen allows you to choose to start the Web browser and jump to a URL by en-

Congratulations! You're the proud owner of Microsoft's Windows 95 operating system. Working on a PC has never been easier.

Now try these ten easy exercises and see how you can work even better and faster in Windows 95 with the all-new Norton Navigator.[™]

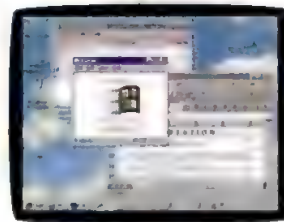
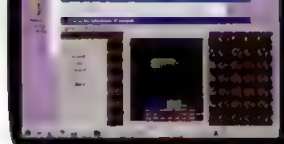
~~CLICK.~~ **1.** First, copy a file from one directory to another. Okay,
~~CLICK.~~ now copy another file. On
~~CLICK.~~ average, it takes about eleven
~~CLICK.~~ steps per file. Now copy a file with Norton Navigator.

5. Try a word search for "profits" or any other text string within files. It's at least ten times faster on average with Norton Navigator. No matter how many files you have. Or how big they are. In fact, the bigger the files, the more time you'll save.

6. Save another minute every time you delete, move, zip, or encrypt from

9. With Norton Navigator, you can create a different desktop for each project. So you can find your work more easily. And save even more time.

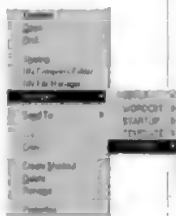
10. Windows 95 supports long file names for all of your new 32-bit applications. Norton Navigator supports long file names



THE TOP 10 REASONS WHY NORTON NAVIGATOR USERS WORK FASTER IN WINDOWS 95.

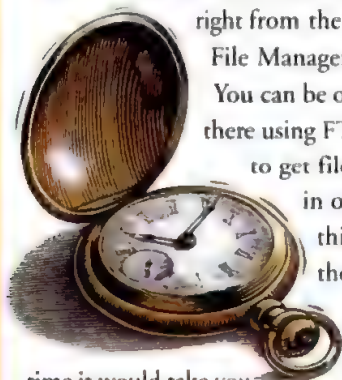
Mission accomplished. One step.

2. Opening a folder in Windows 95 takes a full five clicks of your trusty mouse. But with Norton Navigator, you can open any folder with just one simple click.



3. Compress a file. Our built-in PK-Zip compatible compression saves you a minute every time.

4. Use Norton Navigator to plug into your Internet connection right from the File Manager. You can be out there using FTP to get files in one third the



time it would take you with a separate application.

any application's Open or Save dialog box. (Are you keeping count?)

7. One click is all it takes to access recently opened files or folders from any application. Now isn't that better than wading through folders?

8. Launch your favorite files, folders, or applications simply by pushing a button on the Norton Taskbar. No more going up and down to and from the Start menu over and over again.

NORTON NAVIGATOR FOR WINDOWS 95

NORTON NAVIGATOR ACCELERATES YOUR FILE MANAGEMENT IN WINDOWS 95.

Norton Navigator puts file management at your fingertips with Norton File Manager, Explorer Extension and FileAssist.

Norton Folder Navigator lets you open, copy, move or create a shortcut for any folder with just one mouse click.

Norton Taskbar features multiple desktops that let you organize your files and find your work faster.

Norton FindFind performs up to 10 times faster than Windows 95's built-in search.



SYMANTEC.

for most 16-bit applications, too. So you'll never again have to remember what "billbox" means.

MAKE WINDOWS 95 AN EVEN BETTER PLACE TO BE.

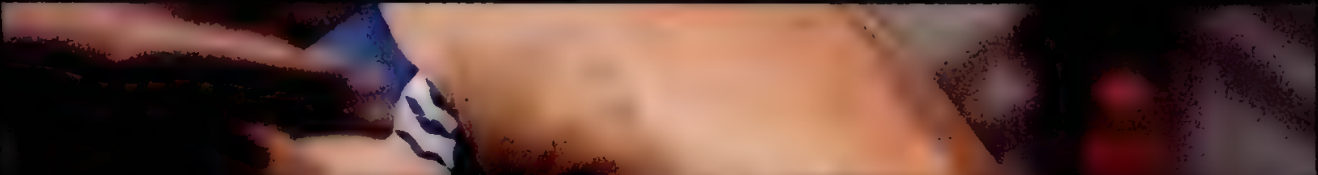
Well, there you have it. Our Top Ten. But try Norton Navigator for yourself and we're sure you'll find your own favorites. Because one of the greatest things about Norton Navigator is it lets you work the way you want to work. Needless to say, it comes with our standard 60-day money-back guarantee. So get your trade-up edition today.

If you own Norton Desktop, PC Tools, XTREE, or Norton Commander, get your \$39.95 trade-up edition* of Norton Navigator for Windows 95 today. To purchase, visit your software store or call us at 1-800-450-9760 ext. 9174.

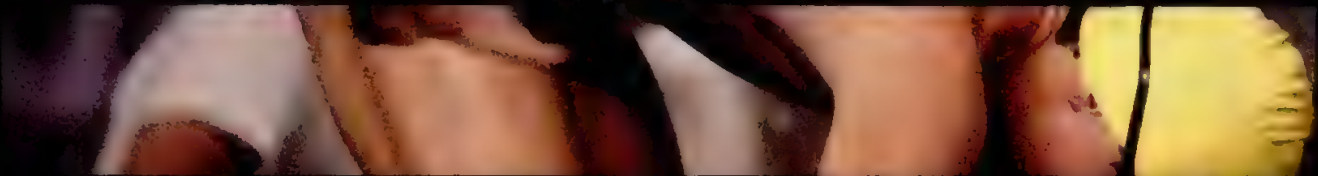




You're on the brink.



Ready to plunge into client/server.



You've got a few butterflies.

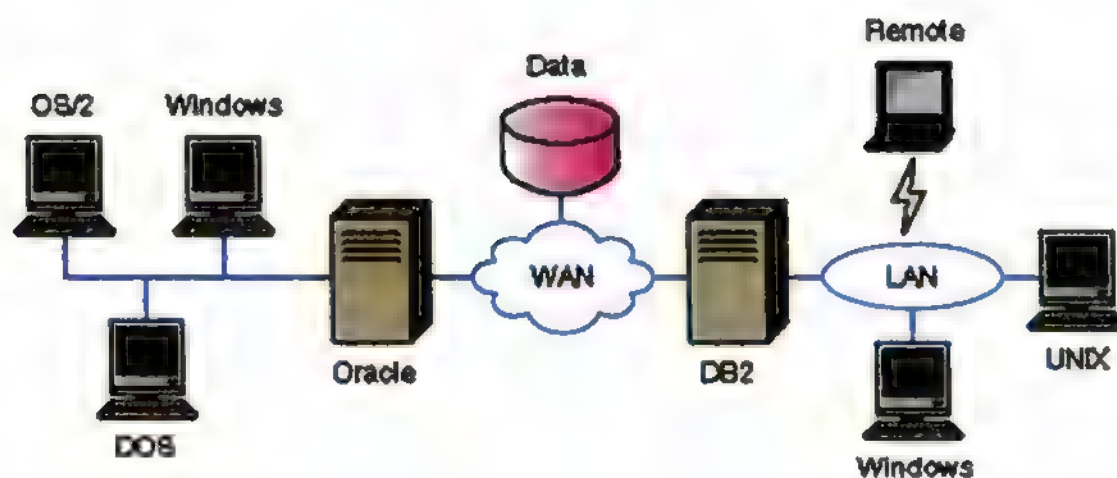


And plenty of questions.



Fortunately, thousands have done it before.





And we can show you their blueprints.

The challenges of adopting the newest technologies are well documented. Fortunately, so are the secrets of doing it successfully.

IBM has helped companies all over the world design and implement multivendor client/server systems. Systems that enable them to gain a competitive advantage, adapt to change and get closer to their customers. And we're very eager

to share what we *Can your computer company do this?* have learned.

That's not to say we can transform your company overnight. But by arming you with the right knowledge, we can definitely make the process more efficient.

We've documented the experiences of hundreds of companies in our Client/Server Advisor. It's an extensive Lotus Notes®-based library of proven solutions that demonstrates how others have solved many of the problems you face, and illuminates the potential pitfalls.

This resource lets you look at the challenge from every angle, to find real solutions that enhance the way your business does business.

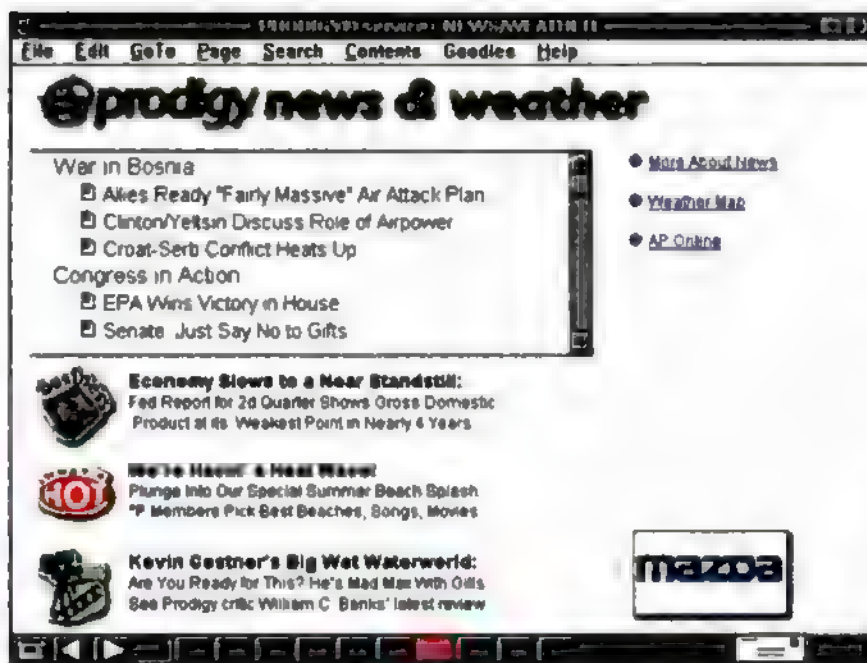
Even better, we're prepared to dive in with you, putting knowledge into action. IBM is committed to a variety of open standards, so we can help maximize your current investments and integrate the new technology you need.

Whether it's made by IBM or anyone else. The goal is to design a system that can change and adapt as quickly as your business.

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Solutions for a small planet™



Each of Prodigy's subject areas features a More About button that leads to screens with links to Internet sites.

tute your own browser.

Prodigy's Personal Web Pages feature, introduced in June, lets you create your own Web pages using ready-made templates. Prodigy stores these pages on its servers at no extra charge. The basic template uses Prodigy's HTML Scratchpad and a fill-in-the-blanks format that prompts users at every stage of the Web page's creation.

The Usenet newsreader is well organized and easy to use. A FAQ Search feature finds and locates a newsgroup's FAQ. There is also a unique feature

that lets you highlight and save multiple threads as a single text file.

Prodigy, while not as feature-rich as AOL, is a solid option for the consumer who wants the comfort of an on-line service coupled with reliable and affordable Internet access.

INTERNET ACCESS SERVICE PROVIDERS

UUnet Technologies Inc.

AlterDial

BY ANGELA GUNN

UUnet provides highly reliable and robust service to users who know what they want and aren't uncomfortable setting up Internet software. AlterDial, the dial-up component of UUnet's AlterNet, has 80 access points (up to 130 by year's end, with 20 additional international numbers). AlterDial offers excellent connectivity and even a good software package in NetManage's Internet Chameleon for Windows (reviewed in this issue), with robust FTP, Gopher, and World-Wide Web utilities, plus e-mail and a newsreader that work together well.

The tradeoff for this no-worry formula is a lack of hand-holding. New users should look elsewhere. Also, pricing is on the high side among service providers. Setup costs \$25; \$30 buys 25 hours of use, and \$2 is charged for each additional hour.

UUnet appreciates that most serious users get upset when they can't connect to the service; the substantial UUnet infrastructure ensures that users will almost never get a busy signal. All of AlterDial's

points of presence (POPs) handle 28.8-Kbps and ISDN connections. The company will assist users in dealing with the frustrating process of coordinating ISDN access with the local phone company.

UUnet's AlterNet specializes in leased-line connections for businesses that require full-time access and provides connections for a number of VARs. The company also offers direct dial-up connections for LAN-based users. Toll-free numbers are available for those logging in from the road or from remote areas.

With AlterNet's direct TCP/IP connections, users can choose any of the TCP/IP stack and Net applications they prefer. Serious Web users are thus free to load their beloved Netscapes and Mosaics. The prepackaged Internet Chameleon software is sturdy and flexible, with the usual contingent of e-mail, FTP, Gopher, telnet tools, Usenet, and Web browsing.

Our technical-support experience was much more satisfying when we weren't asking rank-amateur questions. But the staff is generally very good. Customer support for general problems is available Monday through Friday, 8 A.M. to 8 P.M., eastern time. Support for the connectivity portions of the service is 24 hours, 365 days. There are UUnet newsgroups, but they aren't used much. AlterDial's end users, reflecting their frequently corporate status, tend to be modestly positive when discussing their experiences.

If you know your way around a TCP/IP stack or need to hook up your office, UUnet is a strong contender for your business. The absence of preordained interfaces and the focus on technically adept users ensure that your particular connectivity needs will be met. If that's not you, the Internet Chameleon package may meet your needs, but odds are you'll find greater happiness at a more user-friendly service.

IBM Global Network

IBM Internet Connection Service

BY ANGELA GUNN

The Internet is a star at IBM. The company's commercials for OS/2 Warp prominently feature its Global Network connectivity. And don't tell a soul, but IBM makes very good Windows-based Internet access software, too. You

*How Do You Tell If
It's A "TRINITRON"?*



SUMMARY OF FEATURES

Internet Service Providers: Nationwide

■ YES □ NO

In alphabetical order by company

	IBM Internet Connection Service	internetMCI	NetCom Internet Services	PC MAGAZINE EDITOR'S CHOICE Interramp	PC MAGAZINE EDITOR'S CHOICE Pipeline USA	AlterDial
Company	IBM Global Network	MCI Telecommunications	NetCom On-Line Communications Services Inc.	Performance Systems International Inc.	Performance Systems International Inc.	UUnet Technologies Inc.
Address	3405 Dr. Martin Luther King Jr. Blvd., P.O. Box 30021, Tampa, FL 33630	3 Ravinia Dr., Atlanta, GA 30346	3031 Tisch Way, San Jose, CA 95128	510 Huntmar Park Dr., Herndon, VA 22070	510 Huntmar Park Dr., Herndon, VA 22070	3060 Williams Dr., Fairfax, VA 22031-4648
Phone number	800-455-5056	800-353-3545	800-353-5600	800-774-0852	703-904-4100	800-488-6384
Fax number	813-878-6693	404-668-5232	408-556-3153	800-450-4200	703-904-4200	703-206-5601
E-mail address	notify@ibm.net	moreinfo@networkmci.com	info@netcom-net.com	interramp-info@psi.com	info@psi.com	info@uu.net
World-Wide Web address	www.ibm.com/globalnetwork	www.internetmci.com	www.netcom.com	www.psi.net	www.psi.net/inter.net	www.uu.net
Maximum connection speed	28.8 Kbps	28.8 Kbps	28.8 Kbps	28.8 Kbps	28.8 Kbps	28.8 Kbps
Points of presence (estimated)	300	200	175	150	140	100
ISDN	None	None	None	150	All	All
28.8 Kbps	60	All	All	75	70	All
14.4 Kbps	267	All	All	150	All	All
9.6 Kbps	All	All	All	150	All	All
Dial-up access	■	■	■	■	■	■
Direct TCP/IP connections	■	■	■	■	■	■
800-number access	■	■	■		■	■
Software:						
Proprietary	IBM Internet Connection for OS/2 Warp and Windows	internetMCI	NetCom NetCruiser PLUS	NetManage	Pipeline	NetManage
Standard TCP/IP stack	■	■	■	■	■	■
Service Rates						
Monthly fee	\$29.95	\$9.95	\$19.95	\$29.00	\$19.95	\$30.00
Hours included	30	5	40 (prime time)	29 (prime time)	Unlimited	25
Additional fee per hour when user exceeds limit	\$2.00	\$2.50	\$2.00 (evenings and weekends free)	\$1.50	None	\$2.00
Setup fee	\$19.95	\$18.95	\$25.00	\$9.00-\$50.00	None	\$25.00
Fee for one month of Web, e-mail, and Usenet service (20 hours)	\$29.95	\$19.95	\$19.95	\$29.00	\$19.95	\$30.00
Search Tools and Web Services						
archie	■	■	■	■	■	■
finger	■	■	■	■	■	■
FTP	■	■	■	■	■	■
Gopher	■	■	■	■	■	■
PING	■	■	■	■	■	■
rlogin	■		■	■	■	■
telnet	■		■	■	■	■
Veronica	■	■	■	■	■	■
Web	■	■	■	■	■	■
Web-page construction and hosting	■ ■	■		■ ■	■ ■	■ ■
Server storage included with Web account	■	■	N/A	■	■	■
Mail robots	■	■	N/A		■ (Pipeline New York only)	■
Technical Support						
On-line support	■	■	■	■	■	■
E-mail support	■	■	■	■	■	■
Phone support	■	■	■	■	■	■
Support via Usenet				■	■	■
Technical-support hours	24 hours, 7 days	24 hours, 7 days	24 hours, 7 days	24 hours, 7 days	24 hours, 7 days	24 hours, 7 days
User training					■	■

N/A—Not applicable: The product does not have this feature

BY THE PICTURE ON THE SCREEN.

Multiscan 20se



The best monitors have something distinctly different. The Trinitron[®] Inspiring Vision Logo.

Monitors with this logo have state-of-the-art Trinitron technology inside. Including a vertically-flat screen that minimizes image distortion and light reflections from corner-to-corner. And the revolutionary Aperture Grille. It virtually eliminates the doming and scan-moiré effect. Together, the Aperture Grille and unique electron gun system provide you with a crisper, clearer, sharper, brighter picture.

For the highest quality, look for the Trinitron Inspiring Vision Logo. Then you'll know it's truly a Trinitron monitor.

SONY

A large, round Christmas cake is the central focus, decorated with various festive items including a yellow star, a red and white striped candy cane, a small black umbrella, and several colorful ornaments. The cake is placed on a dark, patterned rug. In the background, a large, ornate wooden door is visible, and the overall scene is lit with warm, golden light, creating a cozy holiday atmosphere.

If this is your hard drive,



Getting peak performance from your jam-packed hard drive just got a lot easier. With Travan™ minicartridge technology, you get a high-capacity, affordable digital storage man-

agement solution with uncompressed capacities from 400 megabytes to 4 gigabytes. So you can easily off-load and reload seldom-used files, archive old information, transfer large documents and back up critical data. With commercially

available software to handle these tasks, your hard drive keeps operating at top efficiency. And so do you. It's one more reason why more businesses protect important information on 3M brand data storage products than on any other brand. Travan technology is supported by

Aiwa, Conner, Exabyte, HP Colorado, Iomega, Pertec, REXON and Teac. For technical information, call

1-800-888-1889, ext. 2301. Or send e-mail to datastorage@mmm.com.



Travan technology solution incorporates your computer, a Travan drive, uniquely shaped Travan minicartridges and appropriate software.



clean it up with the Travan™ technology solution.



SUMMARY OF FEATURES

Internet Service Providers: Regional

	Phone	Fax	E-mail	World-Wide Web
Northeast U.S.				
Cybernetx Inc.	704-561-7000	704-527-3727	info@cybernetx.net	www.cybernetx.net
The Destek Group Inc.	800-656-9547	603-635-7314	Inquire@destek.net	www.destek.net
IDT Internet	201-928-1000	201-928-1057	info@ios.com	www.ios.com
I-2000 Inc.	800-464-3820	908-906-2396	info@i-2000.com	www.i-2000.com
Moran Communications Group	716-639-1254	716-636-3630	info@moran.com	www.moran.com
New York Net	718-776-6811	718-217-9407	info@new-york.net	www.new-york.net
North Central U.S.				
Concentric Research Corp.	517-895-0500	517-895-0529	crcsales@concentric.net	www.concentric.net
Global Connect Inc.	804-229-4484	804-229-6557	info@gc.net	www.gc.net
INS InfoServices Inc.	800-546-6587	515-830-0345	info@netins.net	www.netins.net
OARnet	614-728-8100	614-728-8110	info@oar.net	www.oar.net
Red River Net	701-232-2227	None	info@rnet.com	www.rnet.com
SoDak Net	605-582-2549	605-582-6168	info@sodak.net	www.sodak.net
Northwest U.S.				
Global Enterprise Services	800-358-4437	609-897-7310	market@jvnc.net	www.jvnc.net
NetConnect	800-689-8001	801-865-7079	office@tcd.net	www.tcd.net
Northwest Nexus	206-455-3505	206-455-4672	info@halcyon.com	www.halcyon.com
PrimerNet	800-463-8386	602-870-1010	info@prime-net.com	www.prime-net.com
Telebyte Northwest Corp.	360-613-5220	360-613-5235	info@telebyte.com	www.telebyte.com
WLN Internet Services	800-342-5956	360-932-4009	info@wln.com	www.wln.com
Southeast U.S.				
Cybergate	800-638-4283	305-428-7977	sales@gate.net	www.gate.net
Digex	800-993-4439	301-847-5215	info@digex.net	www.digex.net
Iglou Internet Services	800-436-4456	502-968-0449	info@iglou.com	www.iglou.com
Mindspring	800-719-4332	404-888-9210	sales@mind-spring.com	www.mind-spring.com
SunBelt.Net	800-950-4726	803-323-6434	info@sunbelt.net	www.sunbelt.net
Teclink	800-701-3472	601-949-8945	customer@teclink.net	web.teclink.net
South Central U.S.				
AccessCom	504-887-0022	504-456-0995	info@access-com.net	www.access-com.net
I-Link Inc.	800-454-6599	512-244-9681	info@i-link.net	www.i-link.net
Intergate Inc.	404-429-9599	None	info@intergate.net	www.intergate.net
Novalink USA	800-274-2814	508-836-4766	info@novalink.com	www.novalink.com
Synergy Communications Inc.	402-346-4638	402-346-0208	info@synergy.net	www.synergy.net
Tyrell Corp.	816-459-7584	816-741-5315	info@tyrell.net	www.tyrell.net
Southwest U.S.				
CCnet Inc.	510-988-0680	510-988-0689	info@ccnet.com	www.ccnet.com
CERFnet	800-876-2373	619-455-3990	sales@cerf.net	www.cerf.net
CRL Network Services	415-837-5300	415-392-9000	info@crl.com	www.crl.com
Holonet	510-704-0160	510-704-8019	info@holonet.net	www.holonet.net
Portal Information Network	408-973-9111	408-725-1580	sales@portal.com	www.portal.com
Sacramento Network Access Inc.	916-565-4500	916-565-4501	info@sna.com	www.sna.com

can access the IBM Global Network from OS/2 Warp, Version 3, or purchase the Windows-based Internet Connection software as part of the \$19.95 introductory fee for the service. Though it doesn't hold the new user's hand as much as Pipeline or most of the commercial on-line services, IBM's software is friendly and flexible.

IBM's Internet Connection (also reviewed in "Beyond Browsing" in this issue) centers around its attractive Web

Explorer. The browser supports all the usual Net functions (FTP, Gopher, and telnet, and the usual ancillary viewers); a good newsreader is also part of the package. As a true TCP/IP package, IBM's Internet Connection Service supports any compliant application you'd prefer to substitute, such as Netscape, or any sophisticated tools such as CU-See Me, which allows you to view video images over the Internet. The software should also connect

to any service provider that uses SLIP.

IBM Global Network's SLIP dial-up service has 70,000 subscribers, so it's one of the smaller services reviewed here. IBM has 111 U.S. points of presence (POPs) and more than 200 worldwide; the company expects to have 450 points of presence in almost 40 countries by year's end. In addition, a toll-free number provides access for those calling in from the hinterlands.

Monthly charges are in line with the market at 30 hours for \$29.95 and \$2 per hour thereafter. But while the package emphasizes its Web connectivity, no flat-rate pricing plan is available. Leased-line programs are available for larger outfits, and IBM is well known as a provider of connectivity to large Web sites and other corporate organizations.

Support is handled via newsgroups, through an extensive on-line help guide, on the Web—where the company keeps lists of frequently asked questions and technical information such as supported modems—and via fax-back and toll-free tech-support lines. The Web pages include phone numbers for the other packages, such as NetManage's Chameleon and Ventana's Internet Membership Kit (both reviewed in this issue), that IBM advertises it works with.

Tech support for us was voice mail hell. The system offers to fax you a map of itself—and you'll need it. Live support is available from 8:00 A.M. to 5:00 P.M. on weekdays in each time zone. We got lost in voice mail, though, and no matter how helpful the fax-back information is (and it's quite good), the frustration level with voice mail is exponential.

IBM Global Network, with the biggest array of services of any provider in this review, can be tailored to be anything you want. A no-brainer if you're an OS/2 user, the Windows software is appealing enough to attract deserved interest.

MCI Telecommunications Corp.

internetMCI

BY ANGELA GUNN

If you are what MCI calls the business consumer, internetMCI may be for you. If you're seeking simple access to more traditional Internet tools, such as FTP, Gopher, or Usenet, look elsewhere—internetMCI won't support your needs

as well as other services in this roundup. Pricing for internetMCI is definitely set for a business user whose company will pick up the tab. For 20 hours per month on internetMCI, you will pay \$47.45, compared with just \$19.95 for unlimited hours with either of PSI's services.

With more than 45 percent of the Internet backbone in its care and a decade of providing e-mail service (MCI Mail), MCI knows a thing or two about getting you on-line. With internetMCI, which uses a custom version of Netscape, MCI is one of the first major telecommunications carriers to cater to the overwhelming market demand for Web access. Its extensive use of toll-free access numbers—to be augmented by more than 200 local points of presence (POPs) by year's end—gives it great flexibility for business travelers. At press time, MCI announced an on-line venture with News Corp. that will combine its own e-mail and on-line services with Delphi Internet.

MCI sells internetMCI as a standalone package or as part of a larger family of business information services called networkMCI Business. In addition to internetMCI, networkMCI Business offers a software suite that, if you've been on-line at all, is probably made up of old favorites. The e-mail reader is Connect-Soft's E-Mail Connection; the fax software is Delrina's WinFax; and the TCP/IP stack is from FTP Software. (See "Mail Services for Hire," April 25, 1995, for a review of networkMCI Business.)

Using internetMCI's version of Netscape, you can access FTP, Gopher, and Usenet newsgroups. But in each case, you'll find yourself relegated to Web-speed access, with limited and download-only FTP and a newsreader slow enough to make you kick the habit.

Because FTP Software's TCP/IP stack is Winsock 1.1-compliant, it's possible for more experienced users to go forth and choose their own utilities for news and mail. In fact, the internetMCI package recommends the stalwart Eudora as a suitable POP 3-compliant mail reader.

Technical support, which is 24-hour, is responsible but not inspired. Help is available via the internetMCI Web site or e-mail. Part of internetMCI's Web page is dedicated to marketplaceMCI ([http:// www.internetMCI.com/market-](http://www.internetMCI.com/market-)

place), an electronic shopping forum.

If your small company is looking to get on-line and plans to use mainly the Web and e-mail, you're in good hands with internetMCI. For more traditional Internet service, however, seek a service provider elsewhere.

NetCom On-Line Communication Services **NetCom Internet Services**

BY ANGELA GUNN

NetCom, one of the first Internet providers to offer specialized software for its subscribers, is a solid solution for users eager to get on-line but in need of a comfortable interface and a bit of help setting up. A long-awaited software upgrade with new navigation features should attract additional interest in the 170,000-member service. NetCom is also a good deal: \$19.95 per month gives you 40 hours of access during peak hours (Monday through Friday, 9 A.M. to midnight) and unlimited access at other times.

All of NetCom's 175 U.S. points of presence (POPs) are equipped with 28.8 modems (Canadian ones will be in place by the end of the year). Toll-free access for 8 cents per minute (\$4.80 per hour) will appeal to those in far-flung areas. NetCom says it offers no ISDN service yet because of inconsistent ISDN pricing and availability nationwide.

NetCom introduced its NetCom Internet Services software in June 1994, shortly after PSI Pipeline New York, formerly known simply as Pipeline, introduced Internaut, its own navigator. NetCom's software used a CSLIP (Compressed Serial Line Internet Protocol) connection that shielded users from the vagaries of such things as dynamic IP address allocation and protocol negotiation and did it fairly well. The NetCom software had a Web browser, which Internaut lacked, but users complained about quirky features such as a clever but pointless navigation map showing where various Internet resources were located.

The current version of NetCruiser, Version 1.6, has been refined, and its flexible windowing is popular. The interface allows e-mail, Usenet, Web, Gopher, FTP, and IRC access, along with the usual contingent of file viewers and applications such as telnet. (For another

look at NetCruiser, see "See the Sites.")

The service is scalable to your level of expertise; if you find that you've outgrown NetCom Internet Services, NetCom offers access via non-proprietary SLIP and PPP connections.

The company recently unveiled its NetCom Business Services Group, geared toward providing high reliability and direct dedicated connections to large sites. NetCom's recent alliance with LDDS/Worldcom indicates that business Internet connectivity will grow in importance for the company.

NetCom users are a fairly vocal lot, and some have complained that the service is inaccessible at busy times and Usenet and e-mail message propagation is slow. NetCom has an informal user-advisory community that gives feedback and advice for service improvements. The service also has its own Usenet newsgroups. NetCom has committed itself to providing a stronger official presence in its newsgroups for support, de-emphasizing its much-maligned e-mail help. Toll-free, 24-hour phone support is available. Our calls were answered accurately but slowly.

NetCom is a friendly and scalable solution for getting on-line with a minimum of fuss. If you're a Net novice, it's hard to go wrong with a NetCom account.

Performance Systems International

Pipeline USA and Interramp

BY ANGELA GUNN



Performance Systems International (PSI) wants to be your Internet access provider. PSI's Pipeline USA offers software and pricing for newbies, and its Interramp service offers flexible higher-end, high-speed access for more advanced users. And with an aspiration to offer ease of use on a par with AOL, the 150-points-of-presence provider—with more than 200 U.S. access points by year's end—is reaching out to all markets.

To broaden its reach, PSI recently made several important acquisitions—none more significant than the acquisition of service provider Pipeline New York, from which PSI gained the company's In-

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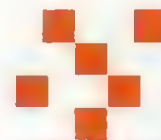
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ternaut software, the first service-provided Windows software. Today's Pipeline USA software competes with other providers' offerings and many bundled packages. (See "Beyond Browsing" for a look at other Internet software packages.)

The current software used with Pipeline USA is good but not spectacular, with a Web browser that is somewhat sluggish and not as easy to navigate as NCSA Mosaic. But as part of PSI's Pipeline USA service, the software is an excellent and sturdy package for new users who don't need sophisticated TCP/IP programs and who value a good e-mail and Usenet reader. Pipeline USA charges a flat rate of \$19.95 per month for unlimited use.

If Pipeline USA would cripple your on-line style, you can use PSI's Interramp, a full-fledged TCP/IP service, priced at \$9 for 9 hours or \$29 for 29 hours, with \$1.50 for each additional hour. (Weekends and non-prime-time weekday hours, 11:00 P.M. to 8:00 A.M., are free.) Interramp will work with anything you can run over a TCP/IP connection: Finger, FTP, Gopher, IRC, PING, telnet, Web, and whois, and more sophisticated tools such as CU-See Me (software that allows you to view video images via the Internet).

Access at 28.8 Kbps is currently available on more than half of PSI's POPs. ISDN single-channel access at 64 Kbps is available now at all locations; by the time you read this, all ISDN access should be at 2-channel 128-Kbps speeds.

Many services offer trial accounts, but PSI is unique in providing 7-day, no-obligation trials for both of its services. Sign up and try it out; if the service doesn't agree with you, your account expires in seven days and you're not billed.

By the time you read this, PSI plans to offer 24-hour technical support. The four PSI newsgroups are safe places for silly questions, and IRC-based help is available. Phone and e-mail support also are available. Our phone support experiences were good, but some users complain that an e-mail response can take a day or two.

If you're not addicted to the Net but suspect you will be, you can't beat PSI's flexibility. With an attractive, prepackaged set of capabilities for beginners and an unlimited growth path for the rest, PSI's Pipeline USA and Interramp services are harmonious ways to get and stay on-line. □



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SEE THE SITES

Using the Internet means much more than just browsing the World-Wide Web. These 14 packages will help you read e-mail, download files, and search for data, too.

Beyond Browsing



Illustration by James Yang

Getting connected to the Internet has never been easier. That's great, because there have never been more reasons to make that connection happen. The World-Wide Web portion of the Internet has experienced explosive growth, taking on a life of its own. Meanwhile, other Internet resources, especially e-mail and FTP file downloads, are becoming more valuable than ever before.

True, much of what we consider real business—buying and selling products directly on the Internet—is still a ways off. But information services—dished up by traditional publishers searching for the digital future and by companies large and small looking for a marketing edge—are flourishing, and suddenly you're faced with an embarrassment of riches.

Unfortunately, despite the hype (much of which is, in fact, deserved), there are still many areas of the Internet that are neither easy to get to nor easy to get around in once you've arrived.

Today there are more ways than ever to connect to the Internet. You can dial up one of the commercial on-line services such as America Online, CompuServe, or Prodigy (we re-

By Rick Ayre and Don Willmott

view their Internet connections in the article "New Paths to the Web" in this issue). Or, if you prefer, you can dial up an Internet service provider (we also evaluate the software you need to accomplish this task).

In this article, we have gathered the tools that make Internet connections under the auspices of Microsoft Windows. These tools use the Windows Socket API, or *Winsock*, to provide the support you need to connect to the Internet.

If you're connected to a LAN, you need a network configuration program. On the other hand, if you're calling an Internet service provider to establish a SLIP or PPP connection, you need a dialer. In either case, you need additional tools to use the Internet once you're connected.

The 14 Internet suites we evaluate here provide these tools. As a minimum, you need a World-Wide Web browser, an e-mail program, a Usenet newsreader to navigate newsgroups, and an FTP client to assist in file downloads. You may also want a Gopher, telnet, or WAIS client to make searching the Internet easier.

Internet suites come in two styles. One takes an integrated approach, where most

USING THE INTERNET means more than just surfing the World-Wide Web. To take advantage of everything that's out there today, you need a collection of diverse Internet access tools.

THERE ARE THREE WAYS to get access tools: in a suite of distinct modules, in an integrated package

if not all of the functions listed above are blended into one interface. Frontier Technologies' SuperTCP Suite, California Software's InterAp, and Quarterdeck InternetSuite are examples of such suites.

The other style takes a modular approach: Each function is included, but remains separate, rather than running under a totally unified interface. Netmanage's Internet Chameleon and CompuServe Internet Division's Internet Office exemplify this style. We examine these differing approaches in depth in the sidebar "Three Suite Styles."

with a single interface, or as a mix-and-match bundle you create yourself from the best available tools. Prices can range from free to about \$400.

MICROSOFT WINSOCK compliance is an important characteristic of the Internet tools you use. This DLL is a standard feature of both Windows 95 and Windows NT.

some of the programs do much to smooth the way.

The Instant Internet module in Netmanage's Internet Chameleon, for example, makes connecting about as easy as it can be: You just pick one of the Internet service providers that offers the option you want, click on the provider's name, then fill out the required information about where you live and how you'll pay for the account. The program calls the provider, gathers all the required configuration information, and places it where it needs to be on your PC. Then you just click on the program to make your next connection: It's a local call to your service provider, and you're connected. All vendors should offer a module as good as this.

Sometimes, though, you need much more information to make a successful connection. If you're going to connect over a LAN, for example, you need to know your IP address, your Domain Name Server, plus the address of your gateway and your host. Usually you can enter that information easily; the easiest way is to make a list of what you need to know and type it in. Once you get the connection set up, you never need to think about it again.

If you're dialing up an Internet service provider, you may need to type the configuration information into a dialer program. You can get this information directly from the service provider. Some of the pro-

BEYOND INTERNET LINGO

A Winsock API is the standard way for Windows programs to communicate with TCP/IP, the networking protocol and lingua franca of the Internet. The idea is simple: If you use a standard Winsock, usually a DLL, to connect to the Internet, then all programs that write to that API can also talk to the Internet. In theory, using a Winsock allows you to mix and match programs. For example, it lets any Web browser you choose work with any dialer you choose. And, in practice, this approach works most of the time.

No matter which path you choose—integrated or modular—you'll quickly find that configuring these programs to make the connection is usually the most difficult part of getting on the Internet. Actually,

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IN THIS REVIEW

Products reviewed	
Acadia/VxD 2.0	153
Explore 2.0	161
IBM Internet Connection	
for Windows 3.0	164
InterAp 3.1	170
Internet Anywhere 2.1	177
Internet Chameleon 4.5	178
Internet Membership Kit	
for Windows 2.0	182
Internet Office 4.0	186
MultiNet for Windows 1.1	187
Netscape Navigator, Personal	
Edition	188
OS/2 Warp Connect 3.0	169
Quarterdeck InternetSuite	
for Windows 1.0	188
Softterm Plus+ 4.0	197
Super TCP Suite 1.1	200
Editors' Choice	153
Suitability to Task	154
Easy Access to Service Providers	164
Internet Tools for Free	165
Summary of Features	168
Three Suite Styles	170
The Next Wave of Access Tools	172
Internet Access	
The Best of Everything	184

grams come with a setup module that calls the service provider, signs you up when you enter your credit card information, and in return receives the required configuration information from the service provider. The program then automatically enters this information where it needs to go. This procedure can be as easy as signing up for America Online.

SET YOUR OWN GOALS

The tools you need depend on what you want to do with the Internet. In any case, you should explore the World-Wide Web. It's fun, and it will give you an idea of what the future of computer-mediated communications holds. There's plenty to see on the Web.

Beyond exploring the Web, the choices are your own to make. The good news is that, in the spirit of the Internet, much of the software we review here is available free to try, either in limited-feature versions, older versions, or as shareware (see the sidebar "Internet Tools for Free" for details and Internet addresses). The conundrum is that to get most of this trial software, you need to be connected already and have an FTP program.

Waiting in the wings, of course, is Microsoft, with plans to make Internet access even easier. The Microsoft Network (MSN) is bundled with Windows 95. With the purchase of the Microsoft Plus! add-on (\$49), you can have full Internet access. Windows 95 already has the software you need to connect and send or receive e-mail (the Microsoft Mail client); Microsoft Plus! offers a Web browser, and MSN gives you access to newsgroups.

Microsoft plans to offer Internet access at no additional cost beyond the MSN connection fee, and with that fee set as low as \$4.95 per month (with three hours of usage), Internet access has become one of Windows 95's most winning attributes.

No matter how you connect to the Internet, you'll find that today it is easier than ever, though still not nearly easy enough. Never has there been more competition among vendors of Internet access tools. As usual, the big winner is you. Keep an eye out over the next several months and you're sure to see all these tools get better, simpler, and maybe even less expensive.

• Internet Chameleon • Internet Office

The perfect Internet suite would have a rock-solid Winsock DLL and would include the best World-Wide Web browser available (one that supports all

the newest HTML extensions). Its other applications, especially its e-mail program and newsreader, would be full-featured, graphical, and easy to use, and all the applications would be 32-bit. To get that perfect Internet suite today, you'd have to put it together yourself (see the sidebar "Internet Access: The Best of Everything").

There are two products, however, that, while not perfect, stand above the others we review here. CompuServe Internet Division's Internet Office (formerly a Spry product), our Editors' Choice last year, has improved in every way. Its Mosaic-based Web browser is among the best, second perhaps only to that of Netscape Navigator. The suite also includes a great e-mail program and an excellent newsreader. Your Web surfing will be relatively fast and very efficient.

Netmanage has been a mainstay in the Internet tools business since long before the hype; its products, good to begin with, have improved dramatically since our last review. All of Internet Chameleon's modules are strong, and its good reputation is well deserved. Most important, its Winsock and dialer are industry standards and rank among the most de-

pendable we've seen.

Our recommendations also depend on which Internet access method you use. If you want the best Internet suite to use with a LAN connection to the Internet, choose Internet Office or Netmanage's more full-featured ChameleonNFS. If you want the best dial-up suite, go with Internet Chameleon, or its similar companion program, CompuServe Information Services' Internet-in-a-Box.

We were also favorably impressed with Quarterdeck Internet Suite for Windows. For a first version, Quarterdeck has done a great job with this suite. Though its Winsock and dialer proved slightly troublesome at times during configuration, its interface is excellent for both Internet novices and experts.

We should also note that Netscape Navigator is still the best standalone Web browser. If you are serious about your Web surfing, it's the one you should use, no matter which additional tools you use to connect to other parts of the Internet. In fact, the least expensive and simplest way to browse the Web effectively today is to use the Winsock and dial-up software in Windows 95 or Windows NT 3.51, and the 32-bit version of Netscape Navigator.



Ipswitch Inc.

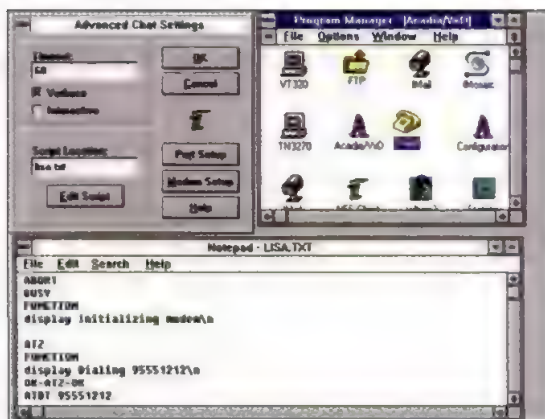
Acadia/VxD

BY ELISABETH H. HOLZER

Ipswitch's Acadia/VxD 2.0 (\$395), a TCP/IP stack that supports direct, SLIP, and PPP connections, is relatively full-featured but difficult to configure, especially for a novice. If you know how to edit a log-in script and can live without a browser that supports the latest features

of the Web, however, you'll find Acadia perfectly acceptable. Acadia is designed for the corporate user who typically has an in-house connection and needs a reliable, flexible tool.

The most difficult part of using any Internet product over a dial-up connection is usually configuring and successfully executing the initial session. To its credit, Acadia's manual lists the information you need to gather from your service provider



Many users of Acadia will need to edit the expect strings in the standard dial-up script.

to make this connection, and the dialer includes a list of national service providers, albeit without pricing information. And Acadia supports Winsock 1.1.

Even after you've gathered the necessary connection information, the configuration process will probably require you to edit the expected strings in the standard log-in script called DIAL.CHT. Unfortunately, Acadia doesn't lead you automatically to this file. Before editing, you

must save the altered script as a new file and enter its name in the appropriate setup box. Experienced users will probably be able to feel their way through this process, but novices will not: There are no dialog boxes to guide them, help them troubleshoot, or inform them of blunders.

We also found the dialer module to be buggy. After we edited and specified a log-in script for a second phone book entry, the dialer repeatedly used the script and settings of the first entry. Ipswitch ac-

knowledges this problem and is working on a fix.

MULTIPLE EMULATIONS

Because it's aimed at a corporate market, Acadia offers multiple flavors of terminal emulation and takes a simple approach, offering six major software modules rather than dozens. Terminal-emulation options include TN3270, which encompasses 3278 and 3279 emulation (models

2-5), and VT320 (which comprises VT52, VT100, VT102, and VT1220). The new features of this version are a Web browser, newsreader, enhanced SLIP and PPP capabilities, and integration of NFS with File Manager.

Acadia's version of Mosaic is relatively full-featured, but not state-of-the-art. It offers partial HTML 3.0 support, the ability to import hotlists (a critical feature if you are already using a browser and want to switch), and the ability to use FTP, telnet, and newsgroups. On the plus side, it lets you edit hotlist entries, add new entries by clicking a button, and browse a log of the sites you visited in previous sessions (a terrific feature for people who don't add a site to a hotlist until they've seen the site a few times).

SUITABILITY TO TASK

Acadia/Vx0. 2.0

	Power	Ease
Installation	Good	Poor
Web browser	Good	Fair
Newsreader	Good	Good
E-mail	Good	Fair
Other tools	Good	Fair

INTERNET ACCESS TOOLS

Suitability to Task

Suitability to task for each Internet access tool was rated in five categories: *installation, Web browser, newsreader, e-mail, and other tools*. The programs were rated for both Power and Ease. Power examines the breadth and depth of the tools for the given task, and Ease looks at how simple the tools are to learn and use.

Installation focuses on setting up the program's TCP/IP stack and Winsock DLL and making a connection. We looked at how the program connects over a LAN and via a modem and examined the tools for connecting if the user already has a service provider.

The **web browser** score reflects the suitability of the tools that help the user navigate the World-Wide Web. We looked at the product's level of HTML support and its ability to help the user on the Web. We also looked at the browser's ability to work as a front end for FTP, Gopher, newsgroups, and e-mail.

The **newsreader** score focuses on the tools for participating in newsgroups. We examined the ability to attach to news servers, search for newsgroups, view existing messages (both in a threaded fashion and sorted by date, subject, or other field), and compose new messages and replies.

SUITABILITY TO TASK		
Product Name	Power	Ease
Installation	Poor	Poor
Web browser	Fair	Fair
Newsreader	Good	Good
E-mail	Good	Good
Other tools	Good	Good

Other tools evaluated included Gopher search tools, FTP file downloaders, NFS, telnet, and Internet Relay Chat, as well as any diagnostic tools that the program included.

The **e-mail** score focuses on all the e-mail tools included in the program. We looked at the way tools manage incoming messages, their handling of attachments for mail being received and sent, and their ability to view messages and send new messages and responses.

The browser, however, stores all entries in a large, unsearchable list rather than allowing you to create folders, and its pointer remains a static arrow while in use rather than changing into a hand or other shape when passed over parts of a graphic or text page that are clickable entities. The best browsers come with a hotlist of varied Web sites, indexes, and search engines to help you start the on-line journey: Acadia's includes fewer than ten entries, though those entries point to useful sites. Acadia supports Netscape and other popular third-party applications.

Acadia's browser supports .GIF and JPEG files but not TIFF, sound, or video files. When it encounters a file type it doesn't support, it prompts you to configure an appropriate viewer.

Acadia's FTP facilities are serviceable, allowing you to see directory listings for both remote and local machines simultaneously and automate log-ons by storing user names and passwords. It also automatically sets transfer file type and comes with a list of 12 popular sites. Company representatives said an interim release, due this fall, will support Windows 95.

Acadia/VxD offers many features for the corporate user, but home users will find it difficult to configure.

Acadia/VxD, Version 2.0. List price: \$395; upgrade, \$95. Ipswitch Inc., Lexington, MA; 617-676-5700; fax, 617-676-5710.

Circle 446 on reader service card

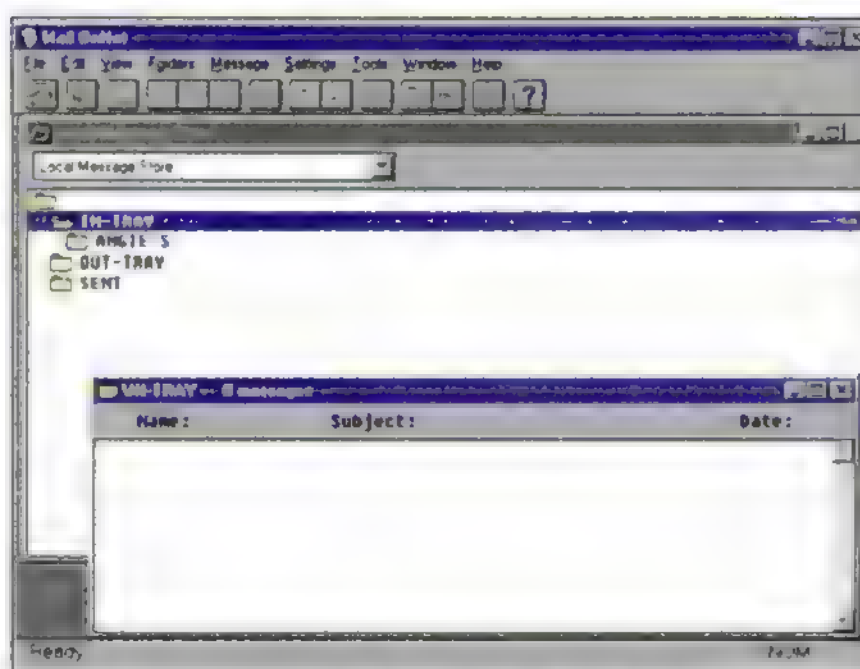
FTP Software

Explore

BY ANGELA HICKMAN

Explore, Version 2.0, from FTP Software, accomplishes its main objective: It gets you on the Internet through a SLIP or PPP account and also provides a near-complete collection of 17 Internet access tools that cover a wide range of functionality reserved for few other packages. But while Explore is easy to use, it lacks the integration of some its competitors, and its applications do not have a particularly inviting look and feel.

Installing Explore on your desktop is as simple as installing any Windows app; it's the setup and configuration of the software that takes some work. Setting up an account with one of Explore's service providers, either MCI or Portal, is the



While Explore's e-mail app works, its folder metaphor lacks a polished look.

least complicated method: You can get up and running on the Net with the help of a Wizard in just minutes by supplying your name and credit card information.

Configuring a dial-up connection with a non-MCI or Portal server via SLIP or PPP is more complex because it requires some knowledge of TCP/IP. Beyond that, you just need to know your modem type and speed and the phone number of the server you are accessing.

The third way to access the Internet is through your network. Though Explore is billed as an asynchronous package complete with its own 32-bit TCP/IP stack (which it implements as a VxD) and dialer, you can run it on your network.

The only catch is that Explore won't let you install its stack if it detects one already. This feature may have seemed less than ideal a year ago, but the advent of operating systems like Windows 95 and OS/2 Warp Connect, which bundle TCP/IP, may make it an advantage: One TCP/IP implementation and dialer will perform all of your Internet-related tasks.

17 ICONS

Explore installs 17 icons, including a launcher icon from which you can invoke any Explore application, connect to a remote host, and define and modify a connection. The others include a Web browser, a newsreader, e-mail, FTP, and telnet applications.

Other utilities include Dialog, which you can use to access IRC servers; Query, an enhanced finger and WHOIS tool; Keyviewer, which lets you view and convert files formats; and Gopher+. If

you want to make files on your system available to other Internet explorers, you can use the Server Control feature to facilitate file transfers. Retriever, a troubleshooting utility, helps gather information for technical support.

Considering the range of functionality Explore offers, its Web browser is surprisingly unexceptional. It's a licensed version of Enhanced Mosaic 2.0 from Spyglass but fails to integrate any forward-thinking functionality like HTML 3.0 support or Netscape extensions.

It supports hotlists from whose pages you can export but not import HTML 2.0, in-line graphics in .GIF and JPEG formats, and .AU and AIFF sound files. You need an external application to manipulate MPEG files. The browser runs smoothly and quickly because of its ability to cache text and graphics in memory, though it doesn't cache recently visited pages to disk.

Mosaic isn't integrated with Explore's e-mail application, except to let you send mail. You can also FTP and Gopher via the browser, though you can't telnet. Explore's file viewer, Keyviewer, is integrated and will automatically launch when it comes upon a file type it recognizes. You can also use it as a standalone application that you access through a separate icon. Aspiring Web publishers can use Keyviewer to convert documents to HTML.

The newsreader and e-mail applications are functional but mediocre in design. And although Mail OnNet's feature set includes an integrated address book, support for multiple windows and attachments, rules or "tasks" that automate the forwarding of your mail, and uuencoding and uudecoding functions, it lacks a polished look. While its folder metaphor

SUITABILITY TO TASK

Explore 2.0

	Power	Ease
Installation	Good	Fair
Web browser	Good	Fair
Newsreader	Good	Good
E-mail	Good	Good
Other tools	Fair	Good

WHAT A
CHARMING
HODGEPODGE
OF SERVERS, PC'S
AND MAINFRAMES
YOU'VE GOT
THERE.

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THAT'S BEEN SHOWN TO MANAGE
MULTIVENDOR ENVIRONMENTS BEST?)

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works well and is intuitive, the interface is a generation behind the competition.

News takes a similar approach. It works well, but its design is unadorned. You can subscribe and unsubscribe to as many newsgroups as you like by double clicking on the desired newsgroup, though News handles only one configuration profile at a time, so switching between newsgroups involves an extra step or two. Like Mail OnNet, News also supports encoding, decoding, and MIME, and you can retrieve the latest unread articles automatically. Explore is also one of a few programs that supports XOVER, an NNTP extension that speeds up the process of threading news articles. Besides threading, Explore offers sorting by date, subject, number of lines, article number, and author.

Explore isn't the best Internet suite available, but its range of functionality is wide. The unfriendly interfaces of the applications may intimidate novice users, but Explore does get the job done.

Explore, Version 2.0. List price, \$99. FTP Software, Andover, MA; 800-282-4387, 508-685-4000; fax, 508-794-4488; Web page, <http://www.ftp.com>.

Circle 447 on reader service card

IBM Corp.

IBM Internet Connection for Windows

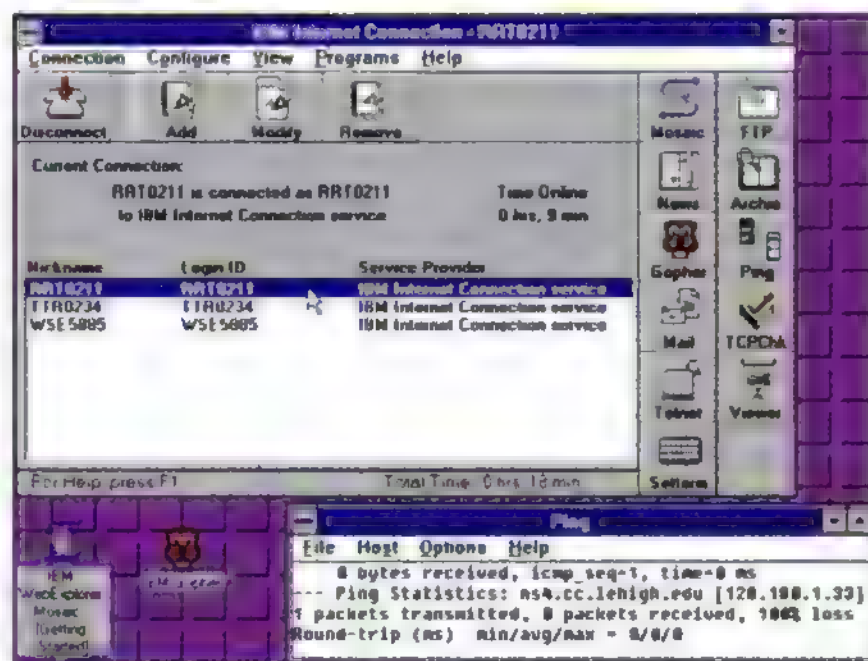
By CADE METZ

After shipping a suite of native OS/2 Internet tools with the first release of OS/2 Warp, IBM has brought its TCP/IP solution to the Windows environment with IBM Internet Connection for Windows, Version 3.0. Designed for use with the IBM Global Network (IGN), Internet Connection is a comprehensive suite of tools whose chief strength is simplicity. If you use an alternate service provider or have your own stack, however, much of that simplicity is lost.

Accessing IGN via Internet Connection is easy and completely transparent. The Quick Install option sets up the tools suite, a dialer, a registration utility, and a TCP/IP stack that supports SLIP connections. The suite includes every major Internet client tool (Web browser, newsreader, FTP, Gopher, e-mail, archie, telnet, and PING) as well as a few supplemental applications

(an image viewer, an application that customizes telnet sessions, and a network connection test).

The registration utility supplies IGN SLIP accounts via a cursory on-line process: With an IGN account, all connection information—including IP address, host name, domain name, and server addresses—is dynamic and doesn't



Internet Connection for Windows' main window lets you dial up your access provider and launch all your Internet apps.

have to be entered by the user. Alternate service providers are listed in a separate file, but you must register with these providers off-line and then enter the ap-

Easy Access to Service Providers

By Rick Ayre

In a crowded market, two Internet providers that offer their own integrated Internet front ends as an option—Netcruiser and Pipeline—stand out as unique Internet alternatives.

Dialing the Internet used to be an unpleasant experience, but now, no matter what access route you take, it's getting easier. Where does that leave Netcruiser and Pipeline, which made their mark as easy-to-use Internet access tools? They may no longer be significantly easier than other options, but they may still be less expensive.

What do you get when you dial up the Internet via Netcruiser or Pipeline? Both are integrated programs with Internet tools such as Web browsers, e-mail readers, newsreaders, Gopher clients, and telnet clients. The tools are combined in interfaces that are easy to

use and require learning only one new program instead of several.

Both programs deliver nearly all they promise, but neither is the stand-out it was a year ago. Things move fast on-line, and these two programs are moving relatively slowly.

IMPORTANT DIFFERENCES

Netcruiser and Pipeline differ from each other in important ways. Netcruiser tries to make the Internet easy without really changing much about it. Pipeline works differently from the way other Internet access tools do: Its newsreader acts differently, and its e-mail reader uses terms that are meant to be intuitive but may confuse those who expect common Internet terminology.

Netcruiser won't connect you at a modem speed faster than 14.4 kilobits per second. Pipeline will connect you

at V.34 speeds in many areas, but its program is so slow you may wonder if you're really connected at 28.8 Kbps.

Both Netcruiser and Pipeline promise new versions of their access tools with many new features soon. They're going to have to move quickly and to add value if they are to be meaningful alternatives much longer.

NetCruiser, Version 1.6. List price: \$25, start-up fee; \$19.95 per month. Netcom On-Line Communication Services; 800-353-660, 408-983-5950; fax, 408-241-9145.

Circle 484 on reader service card

Pipeline New York Software for Windows, Version 2.0.8. List price: \$19.95 per month (unlimited access); \$9.95 per month (5 hours of access). Pipeline (a division of PSINet); 212-267-3636; fax, 212-267-4380.

Circle 485 on reader service card

Internet Tools for Free

By Rick Ayre

Even though most of the software we've reviewed in this evaluation is commercial, much of it has its roots in freeware.

All of the free (or almost free) programs below are either Winsock-compliant or versions of Winsock itself. Many helpful denizens of the Internet keep lists of Winsock software, some with pointers to the best download sites and capsule reviews in their own words. Our two current favorite Winsock sites are Stroud's Consummate Winsock App List and the Ultimate Winsock Collection.

The best-known package for connecting to the Internet that costs nothing is Netmanage's Chameleon. WebSurfer Sampler includes Internet Chameleon 4.01 (we review the most recent version, 4.5, in this roundup), but its connect speed is limited to 9.6 kilobits per second.

Core Systems, too, distributes an Internet connection package free over the Internet for evaluation. Called Internet-Connect, it's not as full-featured as Chameleon, but the features it does have work well and have been updated more recently. We tested Ver-



There's easy access to apps at Forrest Stroud's Consummate Winsock Apps list.

sion 2.1; as shareware, it's priced at \$29.

You can also find shell programs to help you keep track of all your Internet software. The most famous of these is the Internet Control Center from UsefulWare. It's a floating toolbar to which you attach all your Internet programs, such as your browser and your e-mail application, so that they are all just one click away. It's classic shareware, available right now in Version 1.19 for \$24 if you decide to keep it.

Netscape Navigator is still the pre-

mier Web browser. You can download an evaluation copy of it from one of Netscape's many FTP sites. It costs \$39 if you decide to keep it.

CompuServe Internet Division's Spry Mosaic is available to try in a time-limited version. GNN Works, formerly known as Internet Works, is still distributing a prerelease version of its browser, MegaWeb, free. And don't forget the first two Web browsers, NCSA Mosaic and Cello, which always were and still are free. NCSA Mosaic, especially, is worth a look.

The two best free e-mail programs are Qualcomm's Eudora and NETcetera's NETcetera. For the time being, you can also download a free Internet-only version of Connectsoft's Email Connection.

There are a number of good Usenet news readers—and two great ones—that are free for downloading. Our favorite is Net Xpress, but some users prefer Forte's Free Agent. Both are worth looking at.

You should also check out some free FTP clients. Among the best are WS_FTP (freeware), which is our favorite at the moment, CuteFTP (freeware), and IIFTP (shareware).

Product	Vendor	URL
Cello	Cello	None (FTP connection to ftp://www.cornell.edu/pub/LII/Cello/cello.zip)
Chameleon (WebSurfer Sampler)	Netmanage Inc.	ftp://ftp.netmanage.com/pub/demos/sampler/
Consummate Winsock List	Stroud's Consummate Winsock App List	http://uts.cc.utexas.edu/~neuroses/cwsla.html
CuteFTP	CuteFTP	None (check Ultimate Winsock List for a list of FTP links)
Email Connection	Connectsoft Inc.	http://www.connectsoft.com/
Emissary	The Wollongong Group Inc.	http://www.twg.com/
Eudora	Qualcomm Inc.	http://lorien.qualcomm.com/
Free Agent	Forte	http://www2.interpath.net/forte/
FTP	WS_FTP	None (FTP connection to 129.29.64.246)
IIFTP	Kent D. Behrens	http://www.aquila.com.80/kent.behrens/
Internet-Connect	Core Systems Inc.	http://www.win.net/~core/
Internet Control Center	UsefulWare	http://www.usefulware.com/icc.html
Mariner	Network Computing Devices Inc.	http://www.ncd.com/1P/mariner.html
MegaWeb	GNN Works	http://www.megaweb.com/
NCSA Mosaic	NCSA	http://www.ncsa.uiuc.edu/SDG/Software/WinMosaic/HomePage.html
NETcetera	NETcetera	None (check Ultimate Winsock List for a list of FTP links)
Netscape Navigator	Netscape Communications Corp.	http://home.netscape.com/home/
Net Xpress	Net Xpress	None (check Ultimate Winsock List for a list of FTP links)
Spry Mosaic	CompuServe Internet Division	http://www.spry.com/
Ultimate Winsock List	Ultimate Winsock Collection	http://gfeconet.gmi.edu/software/



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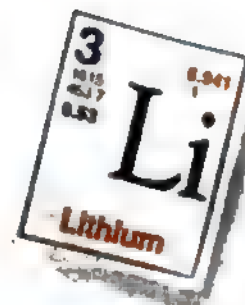
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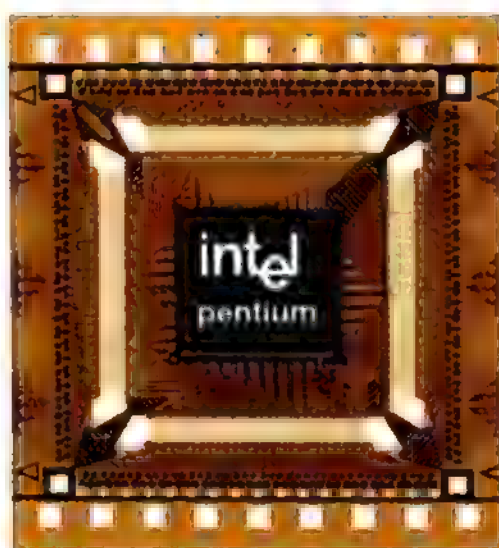
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SUMMARY OF FEATURES

Internet Suite Software

PC MAGAZINE
EDITORS' CHOICE

■ YES ■ NO

In alphabetical order by company

	Acadia/VXD 2.0	Explore 2.0	IBM Internet Connection for Windows 3.0	OS/2 Warp Connect 3.0	InterAp 3.1	Internet Anywhere for Windows 2.1	Internet Chameleon 4.5	Internet Membership Kit for Windows 2.0
List price	Single user, \$395.00; 20-49 users, \$195.00	Single user, \$99.00	Single user, \$129.00	Single user, \$299.00 (full pack)	Single user, \$99.95	Single user, \$79.00	Single user, \$125.00	Single user, \$69.95
Interface	Windows	Windows	Windows	OS/2	Windows	DOS, Windows	Windows	Windows
Support	E-mail, on-line help, toll call	BBS, Compu-Serve, on-line help, toll-free call	On-line help, toll-free call	On-line help, toll-free call, Web site	E-mail, on-line help, toll call, Web site	E-mail, on-line help, toll-free call, Web site	BBS, e-mail, fax, on-line help, toll call, Web site	Fax, FTP mail, on-line help, toll or toll-free call, Web site
TCP/IP implementation	VxD	VxD	TSR	N/A	N/A	DLL	DLL	DLL
Connections supported	Direct, PPP, SLIP	CSLIP, PPP, SLIP	Direct, SLIP	Direct, PPP, SLIP	PPP, SLIP	PPP, SLIP	CSLIP, ISDN, PPP, SLIP	CSLIP, PPP, SLIP
TCP/IP applications included	FTP, telnet	FTP, telnet	FTP, telnet	FTP, telnet	FTP, telnet	FTP, telnet	FTP, telnet	FTP, telnet
TCP/IP utilities included	Finger, PING	Query, Statistics	PING (SLIP only)	PING	PING	Finger, PING, WHOIS	AutoInternet Connection, finger, PING, WHOIS	PING
Internet applications included								
Web browser	■	■	■	■	■	■	■	■
HTML 2.0/3.0	■ ■ (partial)	■ ■	■ ■	■ ■	■ ■ (partial)	■ ■ (partial)	■ ■ (partial)	■ ■ (partial)
Multiple windows	■	■	■	■	■	■	■	■
Multithreading (background downloading)	■	■	■	■	■	■	■	■
Tables	■	■	■	■	■	■	■	■
Gopher	■	■	■	■	■	■	■	■
HTML editor	■	■	■	■	■	■	■	■
Mail	■	■	■	■	■	■	■	■
News	■	■	■	■	■	■	■	■
Server applications included	None	FTP	FTP	None	FTP	Web	None	FTP
Servers supported by vendor	None	Gopher, Web	Archie, FTP, Gopher, news, Web	Archie, news, IRC, Veronica	FTP, FSP, Web	None	FTP, Web	FTP, Web
Terminals emulated	TN3270, TN3278, TN3279, VT52, VT100, VT102, VT200, VT320	SCO ANSI, VT52, VT100, VT220, VT320	ANSI, HFT, VT100, VT200, TN3270, TN5250	ANSI, VT100, VT220, TN3270, TN5270	ANSI, VT52, VT100	VT320	ANSI, AT386, TV1950, TV1955, VT52, VT220, VT320, Wyse 50, WYSE 60	VT100
Scripting languages	None	Connection Wizard, Dialer, telnet	None	None	E-mail, FTP, news, Web	E-mail, FTP, news	PPP, SLIP, telnet	PPP, SLIP

N/A—Not applicable. This package does not come with its own TCP/IP stack.

appropriate TCP/IP data into one of the dozen templates by hand—a daunting task for Internet beginners.

Once you specify the account information, server phone number, and modem type, a single mouse click connects you to the Internet. You can then launch all ten applications from a button pad that runs along the right side of the dialer. It's a convenient setup.

With the Windows App Install option, you can use Internet Connection with a third-party TCP/IP stack. PING, unfortunately, is not installed with this option, but all of the other tools load into a new Program Manager group. In our testing, the tools ran impeccably with the Windows 95 stack, but the IBM Web browser wouldn't operate with the Windows for Workgroups 3.11 stack.

Even if you do manage to get all your tools running on a third-party stack, Internet Connection leaves you out in the cold unless you are using IGN. The Web browser supplies a list of accessible sites, but the newsreader, FTP client, and telnet client do not. IGN offers server sites for all of these tools, but without it you must search for sites on your own.

The tools themselves are solid if unspectacular. WebExplorer for OS/2 was

SUITABILITY TO TASK

IBM Internet Connection for Windows

	Power	Ease
Installation	Good	Good
Web browser	Good	Fair
Newsreader	Fair	Good
E-mail	Poor	Good
Other tools	Good	Good

built from the ground up by IBM, but IBM WebExplorer Mosaic for Windows is merely a scaled-down version of NCSA Mosaic code. It supports HTML 2.0, has limited caching tools, and lacks a detailed status bar for downloads. A viewer application, which is automatically called by the browser when needed, supports .BMP, .GIF, and JPEG files.

SPEED-READING NEWSREADER

Under IGN, IBM Newsreader defaults to IBM's *news-s01.ny.us.ibm.net* and immediately retrieves over 7,000 newsgroups. Its intuitive graphical interface lets you quickly access different servers, subscribe to groups, post messages, and easily organize information.

Much like Ameritech's WinGopher, IBM Gopher spawns a new menu window



Ends

Internet Office Professional Edition 4.0	MultiNet for Windows 1.1	Netscape Navigator Personal Edition	Quarterdeck InternetSuite for Windows 1.0	Softterm Plus + 4.0	SuperTCP Suite 1.1
Single user, \$499.00	Single user, \$400.00	Single user, \$44.95	Single user, \$79.00	Single user, \$49.95	Single user, \$595.00
Windows	Windows	Windows	Windows	Windows	Windows
E-mail, on-line help, toll call, Web site	E-mail, fax, on-line help, toll call, Web site	E-mail, on-line help, toll call	E-mail, fax, mail, on-line help, toll/toll-free call, Web site	FTP, e-mail, on-line help, toll call, Web site	E-mail, on-line help, toll call, Web site
DLL/VxD	VxD	DLL	DLL	DLL/VxD	DLL/VxD
Direct, CSLIP, PPP, SLIP	Direct, SLIP	Direct, PPP, SLIP	Direct, PPP, SLIP	CSLIP, PPP, SLIP	CSLIP, ISDN, PPP, SLIP
FTP, telnet	FTP, telnet	FTP, telnet	FTP, telnet	FTP, telnet	FTP, telnet
None	Finger, PING, Traceroute, WHOIS	None	PING	PING	Fax, finger, NFS, PING, WHOIS
■	■	■	■	■	■
■ ■	■ ■ (partial)	■ ■	■ ■	■ ■	■ ■
■	■	■	■	■	■
■	■	■	■	■	■
■	■	■	■	■	■
■	■	■	■	■	■
■	■	■	■	■	■
■	■	■	■	■	■
FTP, LPR, RCP	FTP	None	None	FTP	Fax, FTP, NFS, TFTP
FTP, Web	FTP	Web	Archie, Gopher Web	FTP, Web	FTP, NFS
VT120, VT220, VT320	VT100-320, TN3270	None	VT52, VT100, VT220, WAIS	ANSI, IBM3101-10, IBM3101-20, RIPTERM, TN-3270, TTY, VT52, VT100, VT102, VT220, 240, VT320, VT340	TN3270, VT100, VT200, VT220, VT320
PPP, SLIP	None	None	PPP, SLIP, telnet	PPP, SLIP, telnet	PPP, SLIP

each time you step through a server's hierarchy. Each item in the menu is accompanied by a different icon: Graphical gopher heads indicate submenus; magnifying glasses mark search tools; colorful geometric icons denote image files.

Like the gopher client, IBM's archie supplies a quick-access list of servers; its slick GUI interface lets you search for topics by substring, display the results in a neat hierarchy, and download desired items in ASCII or binary format. IBM FTP displays directory lists for both local and remote sites; it also stores often-used addresses on a compact button bar. Mail, telnet, and PING perform admirably but lack unique enhancements.

Experienced Internet users should bypass Internet Connection for a more powerful package. Internet novices, however,

will be pleased with Internet Connection as long as they stick to the IGN network. **IBM Internet Connection for Windows, Version 3.0.** List price: \$129. IBM Corp., Research Triangle Park, NC; 800-342-6672; 800-426-2255 (Canada); fax, 800-IBM-4FAX; Web page, <http://www.ibm.com>. Circle 446 on reader service card

IBM Corp. **OS/2 Warp Connect**

BY CADE METZ

As the current generation of operating systems evolves into the realm of Internet access, only OS/2 Warp Connect can boast a fully developed TCP/IP anatomy. Its multifaceted stack, voluminous suite of tools, and integrated installation process provide Internet options

that will appease both the on-line novice and the demanding power user.

IBM's OS/2-based TCP/IP stack—which is installed concurrently with Warp Connect—can accommodate a LAN direct connection, a SLIP connection, or a PPP connection. Consequently, it uses two different suites of Internet tools: one for LAN-based access, and one for dial-in access. Both are automatically loaded into separate system groups but are of similar makeup.

The dial-in side, IBM Internet Connection for OS/2, is almost a mirror image of its Windows sibling (also reviewed here). A registration utility provides instant access to IBM's Global Network provider SLIP accounts, and a dialer connects you to the Internet via a modem. A second dialer utility can be used to access alternate service providers, but it doesn't provide assistance with dial-in scripts.

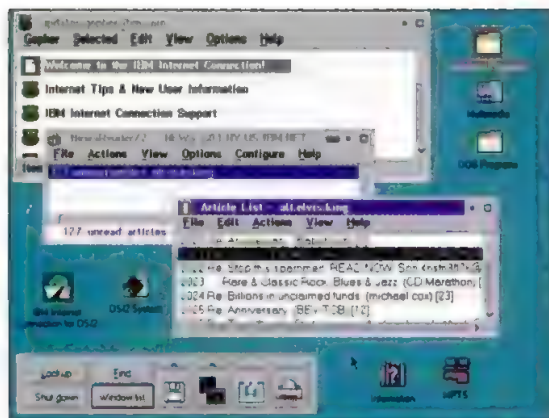
Unlike the Windows version, Internet Connection for OS/2 also offers a Retrieve Software Updates utility. This window lists the most up-to-date versions of IBM's Internet tools (a prerelease version of archie for OS/2 is currently available) and lets you download them with a single mouse click.

LAN CONNECTIONS

The LAN connection side—IBM TCP/IP for OS/2 3.0—isn't much of a departure from the Internet Connection. It lacks a registration utility and an IGN-specific dialer but retains a dialer for other SLIP or PPP accounts (if you aren't using IGN, this setup lets you remove the Internet Connection). For direct access, a TCP/IP configuration notebook houses all router, IP, DNS, and server information. Careful setup of this data and the driver data in OS/2's Multiprotocol Transport Service results in a smooth LAN connection.

BETTER THAN WINDOWS VERSION

IBM WebExplorer for OS/2 is significantly more impressive than its Windows counterpart. Not only does it support HTML 3.0, GIF, JPEG, and TIFF files, but it also displays extensive status bars for both document and art downloads. Its most welcome and unique feature, however, is the WebMap. This full-page diagram hierarchically displays your complete path through the web; a pointer



IBM's OS/2 Warp Connect offers an exhaustive set of native OS/2 Internet applications and a TCP/IP stack.

denotes the current site, but any site can be revisited with only a mouse click. Although the browser is noticeably slow and does not support multiple protocols, it presents irreproachable graphics and is easy to navigate.

NewsReader/2 and Gopher are similar but not identical to their counterparts in Internet Connection for Windows. Although it relies on the same method of message organization, NewsReader/2 opens multiple free-floating windows instead of a consolidated block of data. Fortunately, the positions of these windows can be saved for future sessions. Gopher, on the other hand, uses a single window that is written over with each move in a server's hierarchy. A second window houses a hypertexted list of bookmarks that allows you to retrace your steps.

Of course, FTP, telnet, and TN3270 telnet are also included. For frequently used hosts, a Template option save the settings for customized FTP and telnet sessions; templates reside on the desktop as icons and can directly open the host with which they are associated. The final application is Ultimedia Mail/2 Lite, a bare-bones e-mail package that supports MIME file attachments and uses an intuitive filing system.

SUITABILITY TO TASK
OS/2 Warp Connect 3.0

	Power	Ease
Installation	Excellent	Good
Web browser	Good	Good
Newsreader	Fair	Good
E-mail	Poor	Good
Other tools	Good	Good

IBM Internet Connection is part of the BonusPak that ships with the standard release of OS/2 Version 3.0, but only Warp Connect offers the direct LAN connection. Its use of two separate tool suites is counterintuitive, but all the TCP/IP bases are adequately covered. Of course, OS/2 is also a multi-threaded, multitasking 32-bit operating system—not a bad extra for an Internet suite.

OS/2 Warp Connect, Version 3.0. List price: \$299 (full pack). IBM Personal Software Products, Austin, TX; 800-3IBM-

OS2; Web page, <http://www.ibm.com>.

Circle 456 on reader service card

California Software Inc.

InterAp

By TODD SPANGLER

California Software calls this version of its InterAp suite of Internet tools Version 3.1, but don't be misled: It's the first commercial release of the product. InterAp (\$99.95; also available for a free 30-day trial from ftp.calsoft.com) functions well and includes such desirable features as OLE 2.0 support, a good FTP interface, and a potentially powerful scripting language, but the product is neither completely stable nor as powerful as some other products evaluated here.

To begin with, InterAp doesn't come with a TCP/IP stack, though California Software plans to have a version of the product shipping with Trumpet Winsock 2.1, a bare-bones shareware TCP/IP stack, by the time you read this. Otherwise, you must have an existing Winsock configuration installed. We tested dial-up access with FTP Software's PPP dialer and network access with Microsoft's TCP/IP.

During setup, you can choose which parts of the suite to install, so to use another Web browser like Netscape, you can deselect InterAp's Web Navigator. The other InterAp modules include an e-mail program, newsreader, an FTP client and server, a telnet and terminal utility, and scripting tools called NetScripts.

The main module, the InterAp Launch-

Three Suite Styles

Today, the best individual Internet access tools tend to be better than the individual tools you find bundled in integrated Internet access suites. They do more, and they do it better. Standalone Web browsers are usually faster and have support for advanced formatting; standalone e-mail programs have easier-to-use filters; and standalone newsreaders have better and easier-to-use decoding.

All of these features can, of course, be implemented in integrated suites, too, and in the near future, we'll see even stronger suites. Soon-to-arrive integrated programs such as Wollongong's Emissary and Network Computing Devices' Mariner may well level the playing field.

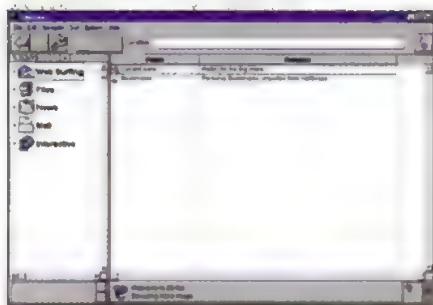
Here we show you the three distinct approaches you can take to get total Internet access: the integrated approach, where you buy your tools all-in-one; a kind of middle-ground approach; and the totally standalone approach, where you mix and match.

The Standalone Approach

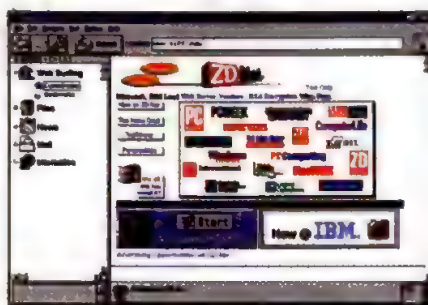


BETTER NETSCAPE: The ZDNet home page is rendered by Netscape Navigator much as it is by Emissary, primarily because no Netscape extensions are used in this HTML file. Note, though, that Navigator features a helpful button bar and menu items that are very Web-specific.

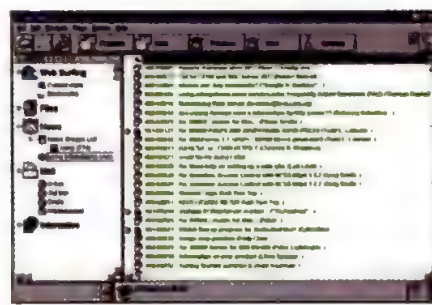
The Integrated Approach



EMISSARY: The soon-to-be-released Emissary groups its functions along the left side. Here you can see its Web browser, FTP tool, news-reader, e-mail reader, and telnet utility.

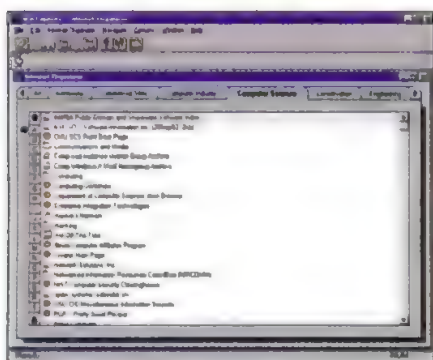


EASY BROWSE: Though surfing the Web with Emissary looks very much like surfing with Netscape Navigator, you can see the minimalist approach to Emissary's navigation aids. All you get are "previous" and "next" arrows and bookmarks.

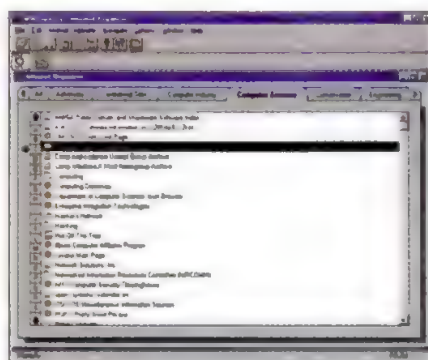


NEWSREADER: Emissary's newsreader looks like its e-mail reader, and both look something like the Web browser. Notice, though, that some of the Web-browsing menu icons have changed slightly.

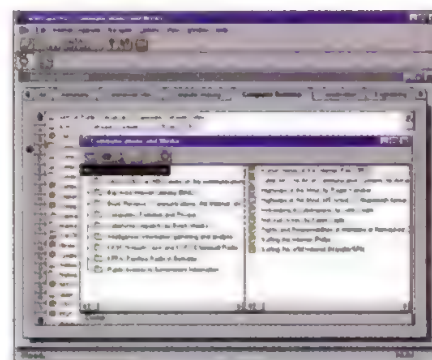
The Semi-Integrated Approach



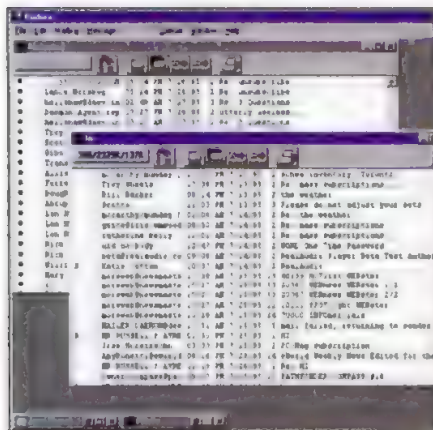
CONTENT CATEGORIES: SuperTCP Suite is semi-integrated because it has Web browsing, Gopher, and FTP functions, but no e-mail or newsreader tools. It organizes its contents by category along tabs.



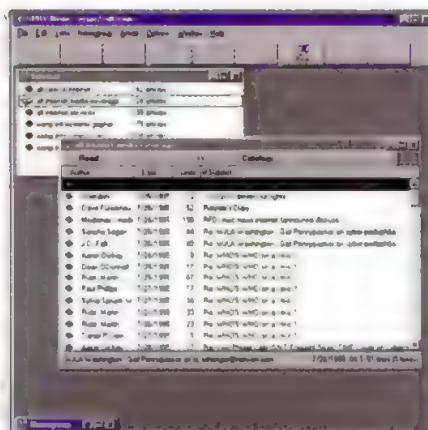
PICK ONE: If you select the Gopher for Communications and Media and then click...



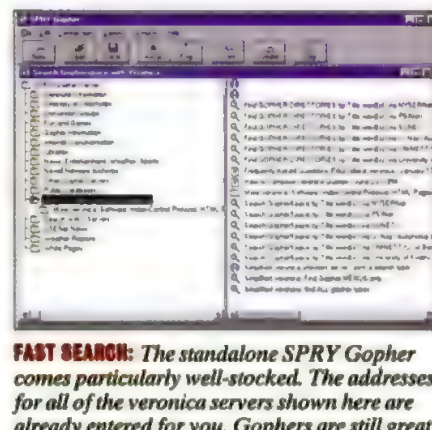
THE RESULTS: ...you see the Gopher menu for that topic displayed using the program's MDI interface.



EUDORA MAIL: Eudora is a great standalone e-mail tool. Its MDI interface makes it easy to track Internet mailing lists, and its filters put messages in predetermined folders upon receipt. Here is an in-box and a folder for a mailing list.



GOOD NEWS: The standalone SPRY News newsreader lets you set up connections to multiple NNTP servers. Its MDI interface lets you create your own groups for clustering news by topics and also sort news by date, topic, and sender.



FAST SEARCH: The standalone SPRY Gopher comes particularly well-stocked. The addresses for all of the veronica servers shown here are already entered for you. Gophers are still great tools for searching for textual content on the Internet.

The Next Wave of Access Tools

By Jenny Donelan

Four Internet access products that were not ready for review at the time this article was written take a similar integrated approach to the Internet.

Two of them, Wollongong's Emissary (800-872-8649) and Network Computing Devices' Mariner (800-416-1956) have proprietary interfaces that attempt to encompass all the Internet applications.

The other two programs, Attachmate's Irma for Internet (800-426-6283, 206-644-4010) and FTP Software's OnNet (800-282-4387, 508-685-4000) are software suites that package everything you need to access the Internet but don't place all the various components under a single interface.

WARM, FUZZY FOLDERS

Emissary provides a Web browser, newsreader, e-mail client, and FTP access in one application designed to resemble Windows' File Manager. Gopher access and HTML editing are planned for the final version, which should be available this fall.

Emissary's interface is basically a browser with an additional task bar at the top screen. From this menu, you can choose to surf the Web, send or read e-mail, or access FTP, telnet, or Usenet news.

Emissary currently supports .BMP, .GIF, JPEG, and other graphical formats. Audio file formats such as .WAV are automatically supported as well.

Emissary will ship in two configurations: Emissary Internet Edition for current Web browser users who are already TCP/IP enabled, and Emissary Desktop Edition, which comes with a

TCP/IP stack for LAN-based users. The Internet Edition will list at \$99; the Desktop Edition, at \$149. Both versions are Windows 95 and Windows NT compatible. A limited-time trial version is available at the company's Web site: <http://www.twg.com>.

MARINER DRAGS-AND-DROPS

Mariner is another Internet tool that aims to do it all for you. Like Emissary, it combines diverse Internet applica-

tions into one program that works on the drag-and-drop principle (in this case, OLE 2.0). Mariner uses a window called AutoPilot to map your Internet tracks and organize information into custom folders. You can also search within the

AutoPilot index. An Internet-wide search engine will be included with the final shipping product.

A friendly folder display for FTP, newsgroups, and other Internet features makes this another package that hides the ugly truth of the Internet's many file formats. You can view embedded graphics on-line (.GIF and JPEG formats are supported at the moment). Particularly impressive is Mariner's off-line capability: Persistent document caching lets you view e-mail messages, Web documents, and other material from your hard disk.

Mariner will ship in the fourth quarter of 1995 at an introductory price of \$99. By the time you read this,

a time-limited trial version should be available from NCD's Web site at <http://www.mariner.ncd.com> or by FTP at <ftp.mariner.ncd.com>.

THE SUITE APPROACH

Attachmate has long been providing connectivity software and service to large organizations. Irma for Internet is the company's new bundled Internet product, created especially for super-productive workers who log many hours at the office and at home. Irma includes the Netscape browser, e-mail, a Winsock-compliant TCP/IP stack, an FTP client application with drag-and-drop file manager capability, and many more Internet tools.

Irma for Internet will be available in September; it will cost \$45 until the end of September and \$85 thereafter.

ONNET FOR NEW USERS

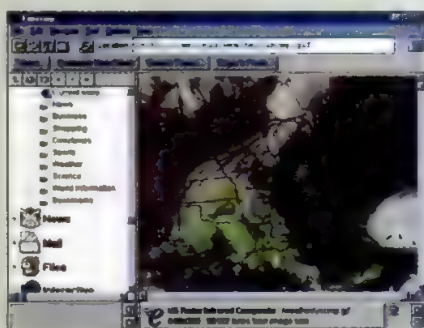
FTP Software's OnNet for Windows, Version 2.0, is a full suite of Internet applications that first-time users will find especially helpful. The main interface offers some comforting advice on what to do when accessing a busy site or how to find your way home again if you get lost on your Internet forays. And FTP's newly acquired KEYview technology lets you view and print

documents and graphics from e-mail, the Web, Gopher, or FTP.

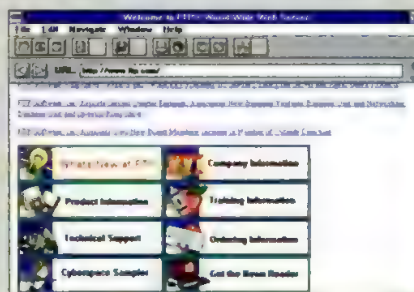
OnNet's Mosaic browser opens with a button box that hyperlinks you to FTP's home page; it also has an Internet search tool library containing WebCrawler, the

WWW Worm, and the like; a Cyberspace sampler; and an Internet Starting Points page featuring popular and useful sites such as the ESPN SportsZone.

OnNet should be available by the time you read this for \$450.



Emissary is one of the most promising Internet packages on the horizon.



OnNet isn't as integrated as Emissary, but its tools are strong.

*What
do you
Aspire to?*

...e to do more.

The new Acer® Aspire™ simplifies my life, so I have
Meet the Acer Aspire.

more time to do all the things I want to do. Nothing

else looks like or performs like Aspire. Its color-

coded cables helped me set up the entire system in

less than five minutes. And ACE, the

Acer Computer Explorer, organizes the

50 preloaded software and reference

A few more things

titles, so I can point and click to

I can do with my Aspire:

find what I need easily. The five-speed CD-ROM¹

Fax from my desktop anywhere, anytime.

drive, integrated microphone and AuraSound™ 3-D

Make my own flight reservations.

stereo speakers make multimedia, games and presen-

Act on a hot stock tip.

tations really pop. And with Windows® 95 and an

Keep up my daily workouts.

Intel® Pentium® processor², it can run any software out

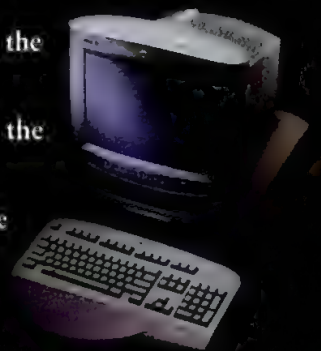
Never miss an important phone call.

there. I can even navigate through programs without

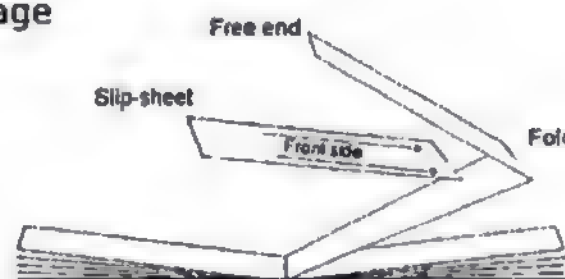
And cruise around the Internet.

typing, using its voice activation capability. Aspire

fits my personal style — to make the most of every day.



1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



Foldout slip-sheet



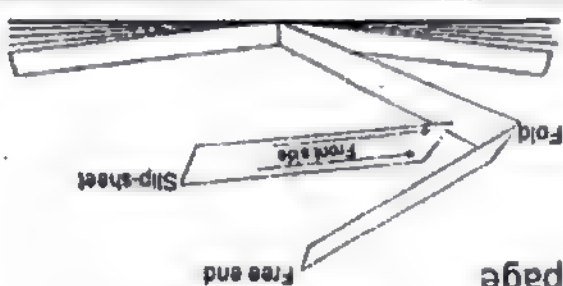
Inverted Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with

1. Front side touching the free page
2. Arrow pointing to the fold

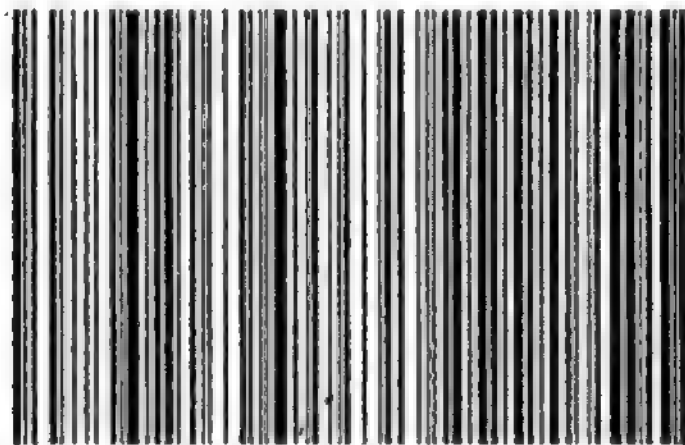
3. Slice the folded edge

4. Close the page and slip-sheet



1. Follow instructions on the other side

Inverted Back

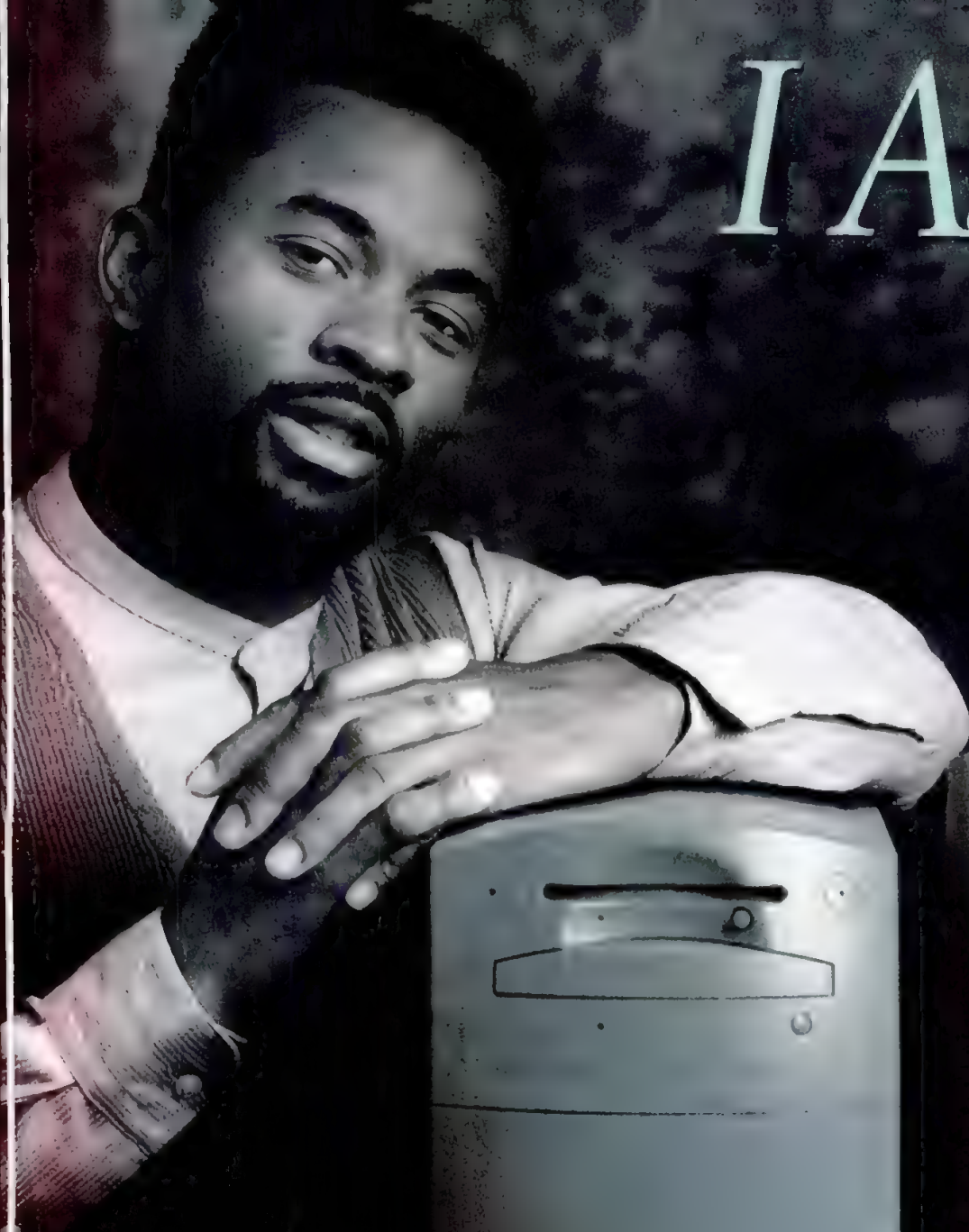


GbsSlipBack-0018

Back

1. Follow instructions on the other side

I Aspire



Acer



Acer



Everything You Aspire To.



Aspire Desktops

Processor Choices

- 486DX4/100
- Intel Pentium processor

System Memory

- 8MB system memory; expandable to 128MB*

Expansion

- Two PCI slots*
- Two ISA slots (three on DX4/100 models)
- One shared by PCI and ISA*

Modem

- 14.4kbps fax/modem

Mass Storage

- 540MB to 1GB hard drives

Aspire Minitowers

Processor

- Intel Pentium processor

System Memory

- 8MB system memory; expandable to 128MB

Cache

- 256KB second-level cache

Expansion

- Three PCI slots
- Four ISA slots
- One shared by PCI and ISA

Devices/Bays

- Three additional expansion bays

Modem

- 28.8kbps fax/modem

Mass Storage

- 1GB to 1.6GB hard drives

All Aspire systems include:

Graphics

- Accelerated graphics with 1MB video memory, expandable to 2MB
- Full-motion video acceleration hardware supports software MPEG video playback

Multimedia Features

- Sound Blaster™-compatible 16-bit stereo sound card
- Up to 44.1kHz sampling rate
- Five-channel stereo mixer
- Joystick/MIDI port
- Quad-speed CD-ROM on most models

Modem

- Two modem telephone jacks
- Fax modem with telephone answering machine/voice mail
- Full-duplex speakerphone

Devices/Bays

- One 3.5" hard disk drive
- One 3.5" 1.44MB diskette drive
- CD-ROM drive in 5.25" bay

Warranty

- Three-year limited warranty; first-year replacement service; second and third years Carry-in or Mail-in

Software

- 50 preloaded software and reference titles (a \$1700** value)



Aspire Monitors

Screen Sizes

- 14", 15", and 17" color monitors with viewable images of 13.1", 13.6" and 15.7" respectively

Dot Pitch

- .28mm

Resolution Support

- 14" Aspire 33s: 800 x 600 and 640 x 480 and all VGA modes
- 15" Aspire 56s: 1024 x 768 at 75Hz, 800 x 600 at 72Hz, 640 x 480 and all VGA modes
- 17" Aspire 76is: 1280 x 1024 at 60Hz, 1024 x 768 at 75Hz

Front-Panel Controls

- 14" features analog controls
- 15" and 17" feature digital controls

On-Screen Functions

- 17" monitor features on-screen controls

Audio

- Up to six watts/channel, stereo speakers
- Unidirectional microphone

Warranty

- Same as Aspire systems; If standalone, only One-year Carry-in or Mail-in

For the location of the
Acer Aspire dealer nearest you,
call 1-800-529-ACER
Or visit us on the World Wide Web
at <http://www.acer.com/aac/>

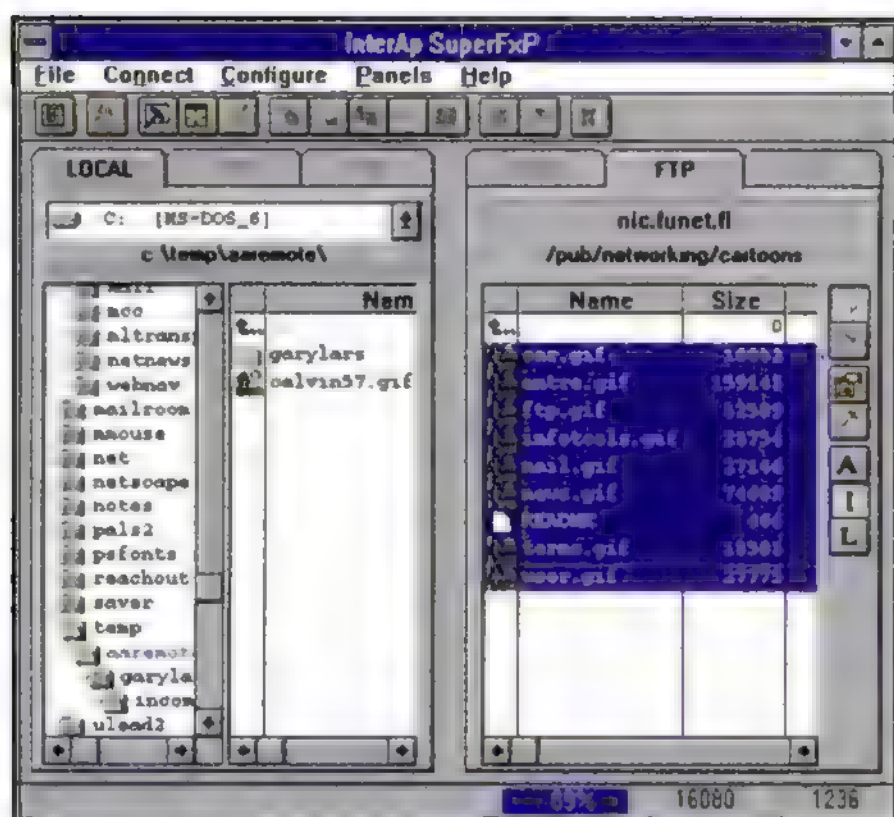
Acer



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Acer and the Acer logo are registered trademarks and Aspire is a trademark of Acer America Corporation and Acer Inc. All other brands and product names are trademarks or registered trademarks of their respective companies. © 1995 Acer America Corporation. All rights reserved. *Specifications vary by model and configuration. **Pentium processor-based systems only. **Based on manufacturer suggested retail price. Not all models/colors available at all retail locations. See your local retailer for more information.



InterAp's FTP client can handle a background transfer of files from an FTP or FSP site to your PC.

tic IP addresses.

The e-mail, NetNews newsreader, and Telnet terminal (which can also be used for asynchronous dial-up) are unremarkable parts of the suite. The mail application uses MIME for attachments but can't create uuencode or read uudecode formats in this version. Also, users can't categorize messages in logical filing folders.

The suite has good integration features, both among its own programs and with other Windows applications. Since most of the InterAp applications are OLE 2.0 enabled, you can, for example,

drag text from Microsoft Word for Windows to the mail icon and it will be added as an attachment.

The Web Publisher, one of four finished NetScripts included with InterAp, can retrieve Web pages and save them as Word or Excel documents; it can even automatically mail them through InterAp's mail.

Besides some general instability, the product's immaturity shows in the occasionally incomplete or misleading documentation. For example, the only help available for Netscripts is on-line, though you can send away for a printed document from the company.

Try out InterAp if you've got a TCP/IP stack already installed and you want a standard set of Internet applications that have good integration and scripting potential in NetScripts. But you'll find it's not the best solution if you want the most full-featured and robust Internet apps.

InterAp, Version 3.1. List price: \$99.95. California Software Inc., Corona del Mar, CA; 800-830-3311, 714-729-2270; fax, 714-729-2272; Web page, <http://www.calsoft.com>.

Circle 449 on reader service card

SUITABILITY TO TASK

InterAp 3.1

	Power	Ease
Installation	Poor	Good
Web browser	Fair	Fair
Newsreader	Good	Good
E-mail	Excellent	Fair
Other tools	Good	Good

MKS Inc.

Internet Anywhere

BY PADRAIC BOYLE

Because MKS's Internet Anywhere is aimed at the home and small-business user, its TCP/IP stack provides support only for dial-up SLIP/PPP connections, and it lacks FTP server and NFS applications. And although its Web browser supports Gopher searches, there is no separate Gopher utility. Two features, however, really stand out: an integrated search facility and handy scheduler that performs background exchanges.

Installation is easy. Internet Anywhere has the capability to connect to one pre-configured Internet service provider, Portal Information Network. After the pre-configured script connects you to Portal, you enter name, address, and credit card number information and chose the nearest Portal connection. New users to Portal are given a 30-day free trial period; afterwards, the price is \$9.95 per month and \$2.25 per hour. Information on more than 170 other service providers worldwide is also available on-line.

Internet Anywhere's desktop consists of the basic Internet applications, such as an e-mail reader, a Web browser, and a newsreader. The desktop is flexible, letting you easily replace or add applications.

Like MultiNet, Internet Anywhere has a Web browser licensed from Spyglass. It supports HTML 2.0 and multiple connections. Web sites are easily added to its hotlist with the click of an icon. Several sites are already included in the hotlist, including the Whole Internet Catalog, Yahoo, and the MKS home page. Unfortunately, you can't separate your favorite Web sites into categories, and the browser doesn't support Netscape extensions. To change the memory page cache, you must edit the .INI file with a text editor.

POWERFUL SEARCHING

One Internet Anywhere's hottest features is a powerful search facility. Based on Open Text Corp.'s Web Index search engine, this powerful front end creates structured queries using indexing. Searches can be service-specific—FTP, Gopher or Web sites—or you can search the entire Internet. You can use Boolean and com-

Pad, is a floating toolbar with buttons to launch the suite's applications. Using the Grab option lets you easily add other applications and files with just a click on the desired item.

When you launch the Web Navigator, the default home page is a document on the local hard disk that contains some links to helpful starting points such as Yahoo, the Internet Business Directory, and EInet Galaxy.

The Web Navigator is not as full-featured as other products in this evaluation. It can read only some HTML 2.0 features and hardly any Netscape enhancements such as background textures, and it doesn't use a multithreaded page-loading technique to display text before graphics (although a toolbar button lets you toggle graphics on or off).

STRONG FTP CLIENT

With its easy-to-use interface, the Super FTP client application stands out from its dull siblings in the InterAp family. For example, two directory panes sit side by side, so after connecting to an FTP or FSP site, you can drag-and-drop the files you want to transfer to either your local hard disk or to another FTP or FSP site. The file transfer can take place in the background.

InterAp includes an FTP server application to let Internet users access your PC as an FTP site, but you'll encounter problems if your network has firewalls to block entry to users outside your domain, or if your Internet provider doesn't supply sta-



Internet Anywhere's desktop puts the most frequently accessed Internet applications right up front.

pound searches to create precise results.

The newsreader bundled with Internet Anywhere operates in a off-line manner. When you first access the newsreader, a list of all the Usenet newsgroups downloads onto your hard disk (it takes about 10 minutes at 14.4 kilobits per second). You can then page through the list and choose the newsgroups you want to subscribe to. Once you do, a copy of the subscribed newsgroups downloads to your hard disk. Depending on the number and the size of the newsgroups, this procedure can take hours.

You can read and post messages off-line. The newsreader gives you the option of downloading the latest news items from the subscribed groups. In the long run, operating off-line is cheaper but makes it more difficult to surf around randomly among other newsgroups.

To avoid the costs and hassles related to exchanging mail and newsgroup postings, Internet Anywhere has a scheduler that automatically executes tasks at specific intervals. From a pull-down menu, you can configure Internet Anywhere to connect to the service provider, exchange e-mail, and download and update your newsgroups. Scheduled events can take place in the background.

Internet Anywhere's e-mail application

also operates off-line. You can read and compose mail without being connected. All the e-mail functions are present, including an address book. The only place this app falls short is when sending multiple file attachments in a mail message.

Like most of the other Internet packages reviewed here, Internet Anywhere has an FTP application that offers drag-and-drop capabilities between a host computer and your hard disk for easy file transfers. Note, though, that it's client-only. MKS plans to have a FTP server in a later release. The telnet application operates in a DOS box and provides very few bells and whistles.

By the time you read this, Internet Anywhere 2.2 will be available. Designed for Windows 95, it will operate specifically with the Windows 95's TCP/IP stack.

With the addition of a Web browser and other Internet applications, Internet Anywhere 2.1 offers a full-featured Internet solution for the home user. Even though it lacks other Internet tools, its great search facility is an admirable asset.

Internet Anywhere, Version 2.1. List price: \$79. MKS Inc., Waterloo, Ontario, Canada; 800-507-5777; 519-883-3242; Web-page, <http://www.mks.com>.

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Netmanage Inc.

Internet Chameleon

By TODD FEINMAN



Netmanage's Internet Chameleon, Version 4.5 (\$125), is a complete Internet suite for connecting to the Internet via a modem. Its TCP/IP stack connects you to a service provider via PPP, SLIP, CSLIP, or ISDN. With Internet Chameleon, you should be able to accomplish everything you need to do on the Internet.

Installing Internet Chameleon is simple, taking less than 10 minutes on most PCs. You aren't asked any questions until the end, when you configure your PC's connection—and the Auto-Internet utility makes this part very easy.

WebSurfer, your link to the World Wide Web, is the included browser. It has a good interface, great helper applications, and support for graphics formats including .BMP, .GIF, and JPEG. You can bring up a hotlist box to save your favorite links and a history window for revisiting sites within a session. Web experts, however, will notice a few missing features, such as multiple windows or enhanced Web pages that use HTML 3.0 specifications like tables and dynamic document updating.

Internet Chameleon's e-mail client has everything you need to communicate electronically on- or off-line. It supports spell checking, MIME attachments, on-the-fly uuencoding, a signature file editor, receipt and read requests, and it has an address book for both people and groups. The e-mail reader can also check your mailbox for new mail right down to the minute and let you read mail off-line, which saves connection fees.

GREAT NEWSREADER

NEWT News, Internet Chameleon's newsreader, is among the best we've seen. News and e-mail are integrated together. The newsreader's interface is graphical, letting you view and sort by author, subject, article number, date, size, status, and threads. You can open more than one article at a time, and the newsreader has built-in support for automatically uuencoding multiple articles if they are split.

Internet Chameleon's Gopher server makes viewing Gopherspace effortless. The hierarchical menus are easy on the eyes and contain icons for representing the kind of data within a branch. There's a search engine and bookmarks for easy access. Also included isarchie, the Gopher keyword search engine.

You can grab a specific file with FTP, the fastest, easiest way to download from the Net. Internet Chameleon's FTP looks and acts like a file manager. To get you started, Netmanage bundles Ecco Lite 2.0, which contains 2,000 assorted Internet addresses.

If a server doesn't support FTP log-ons, you can download files using telnet. This version keeps a connection profile for each site; for multiple instances, there's a session manager that shows all your connections' information, such as host, time on-line, and emulation type.

SUITABILITY TO TASK Internet Anywhere 2.1

	Power	Ease
Installation	Fair	Good
Web browser	Good	Good
Newsreader	Good	Fair
E-mail	Fair	Good
Other tools	Good	Excellent

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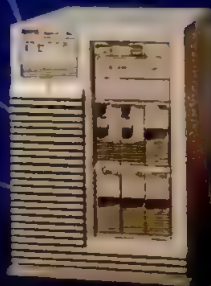
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OTHER UTILITIES

Internet Chameleon is packed with other utilities, too. NEWT Shooter hooks onto your applications' title bars and directly sends highlighted addresses to WebSurfer and Mail. Talk lets you communicate in real time via the keyboard with other Internet users. PING checks a host's connectivity. Name Resolver tells you an IP address or host name. Finger finds a user on the specified host. There's also a graphics viewer, NEWT View, and a sound player, NEWT Sound. All the utilities in the suite can log your session, keep multiple configuration files, diagnose your connection, and let you customize fonts and colors.

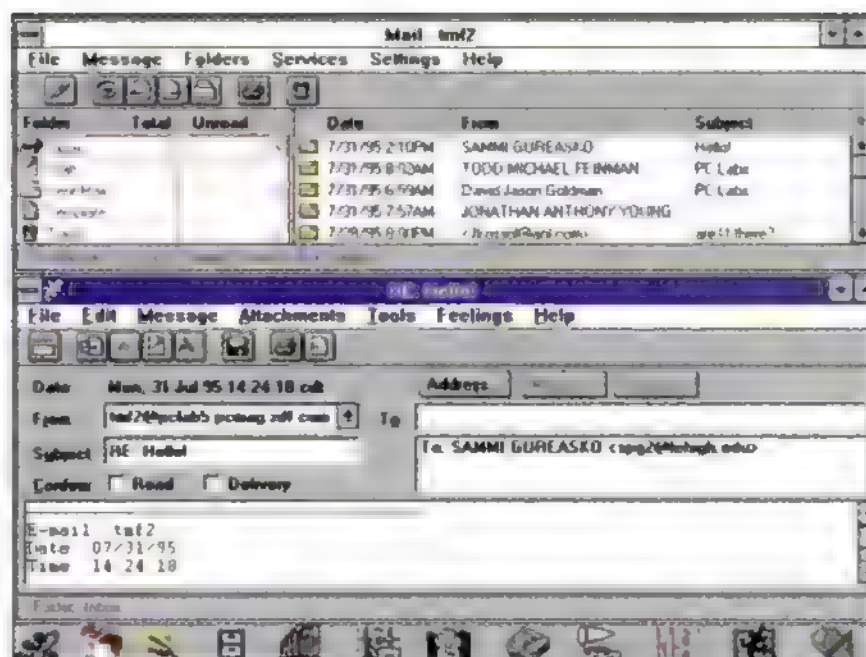
If a direct connection to the Internet suits your corporate needs, you can purchase other flavors of Chameleon, including ChameleonNFS and Chameleon32NFS for Windows NT. Designed as complete desktop solutions for implementing disparate private and public LANs into one network, they come with over 40 client and server tools. ChameleonNFS, Version 4.5.1, offers support for Ethernet and Token Ring networks. It includes integrated SNMP agents and works with NetWare and Microsoft LAN Manager, among other environments.

If you access the Internet via a phone line, Internet Chameleon is an exceptional suite of tools, notable for its integration, ease of use, and intuitive graphical interface. If you have a faster Internet connection, choose either ChameleonNFS or Chameleon32NFS; both have server applications in addition to client apps. Either way, it's an unbeatable collection of tools. **Internet Chameleon, Version 4.5.** List price, \$125. Netmanage Inc., Cupertino, CA; 408-973-7171; fax, 408-257-6405; Web page, <http://www.netmanage.com>.

Circle 451 on reader service card

SUITABILITY TO TASK Internet Chameleon 4.5

	Power	Ease
Installation	Excellent	Excellent
Web browser	Excellent	Good
Newsreader	Excellent	Excellent
E-mail	Excellent	Excellent
Other tools	Excellent	Excellent



Mail, one of Internet Chameleon's 18 utilities, has an advanced multidocument interface.

Ventana Communications Group Internet Membership Kit

BY DAVID MORLITZ

The Internet Membership Kit for Windows, Version 2.0 (\$69.95) from Ventana Communications Group is a good choice for any newcomer to the Internet. Once the software is installed, you can be up on the Internet in a matter of minutes if you use a service provider supported by the software.

The package comes with a wide selection of Internet utilities. All of the apps in the Kit, including the TCP/IP stacks, are Winsock compatible. You can use any apps you download (if they are Winsock compatible) while you are connected to the Internet, and all of the tools provided can work with a different Winsock TCP/IP stack. The Kit includes Ventana Mosaic, the WinVN news reader, and the Chameleon WebSurfer Sampler, which consists of FTP, e-mail, a PING utility, and a telnet client.

The Kit gives you a choice of two different stacks and includes a special offer of the IBM Global Network (IGN) that waives the initial registration fee. It also includes programs that can immediately activate of your IGN account and provide full pricing information and terms. If the IGN isn't to your liking, you can use the Chameleon Sampler, Version 3.11, which is a dial-up only interface, as your TCP/IP stack. The only protocols the Sampler supports

are SLIP, CSLIP, and PPP; it has no support for direct network connections.

If you use IGN with the Kit you will be on the Internet within minutes of installing the software. The Chameleon Sampler takes longer to get running, but it supplies information on more than 20 different service providers.

If you decide to use a service provider that is neither IGN nor one of the others listed in the Chameleon Sampler, you must rely on the service provider to supply all of the necessary information, though you can call Ventura for technical support.

MOSAIC-LIKE BROWSER

Ventana Mosaic, a Web browser similar in appearance to NCSA's Mosaic, supports multiple documents but not multi-threaded downloads. You can have two documents open at the same time, but once you select a link you can no longer view the second document or perform any actions until the network download is complete. Ventana Mosaic doesn't support Netscape extensions, and the support for HTML 3.0 is only partially in place. Certain HTML 3.0 features, such as tables, are not yet supported. The browser currently supports Gopher, HTTP, and FTP, but you can't access telnet or NNTP sessions from it without editing your WIN.INI file.

Bundled with the package is Ventana's book, *Internet Roadside Attractions*, which lists interesting sites across the Internet and covers many different topics. You also get a CD-ROM containing the full text of the book in HTML format. Ventana keeps



One site to visit with the Internet Membership Kit's browser: Ventana's own on-line book.

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Internet Access: The Best of Everything



Netscape Navigator is the best standalone browser you can get today. If you're upgrading to Windows 95 or use Windows NT, be sure to get the 32-bit version.

By Rick Ayre

To take full advantage of the Internet, you need quite a few pieces of software: a Winsock DLL, a Web browser, an e-mail reader, a newsgroup reader, an FTP client, and perhaps a Gopher client and some other search tools.

Getting all these tools can be easy if you buy an integrated Internet access package. It is harder but potentially more rewarding to pick and choose the best utility in each category and build your own suite.

While fully integrated programs

Navigator not only does what most other browsers do, only better—it does some things other browsers don't do at all.

At *PC Magazine*, we're content providers on the Internet as well as content consumers. We like Navigator because through its proprietary HTML extensions we can create more interesting pages. Many others who publish to the Web are doing the same.

Navigator lets you see things other browsers don't; it also works smart. Its bookmarks, for example, continue to get easier to use. It comes in 16- and 32-bit versions, and there's a version that works well with Windows 95 and Windows NT 3.51.

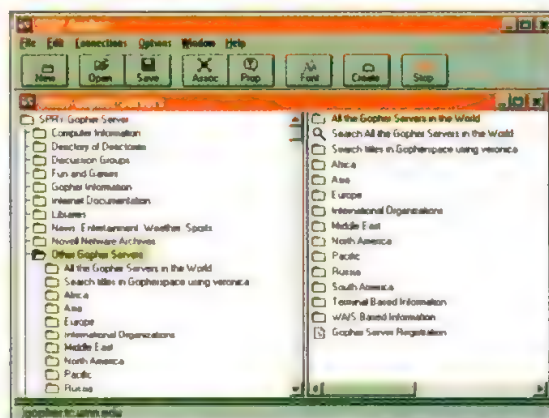
BEST E-MAIL

Along with ZMail, one of the best e-mail programs is Qualcomm's Eudora, Version 2.1.1. Its Windows version has filters and nested folders, and

it can set up multiple mailboxes as well as multiple signature files. While its address book is still suboptimal, the program does everything you need an Internet e-mail program to do, and you don't need a manual to figure out how to get things done. Best of all, Eudora has a trial version, called Eudora Lite, that you can download and try for free (see the sidebar "Internet Tools for Free").

BEST GOPHER

The last time we looked at Gopher clients, Ameritech's WinGopher was head and shoulders above the pack. It's still a good choice, but so is the SPRY Gopher from CompuServe Internet

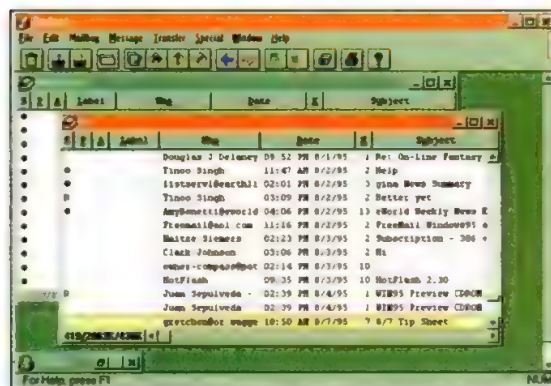


Searching the Internet with a Gopher client is an efficient way to find information. The best standalone tool to do it: the SPRY Gopher, which has a huge resource list.

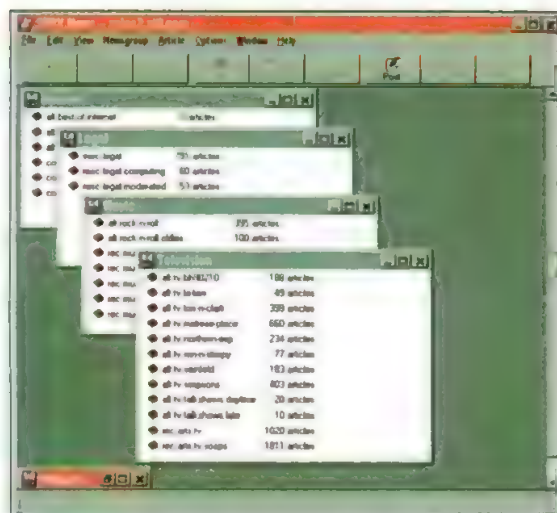
Division, which now comes with a bigger resource list—including a few Veronica servers you can actually connect to.

BEST NEWSREADER

SPRY News is by far the best newsreader you can get. It gives you multiple connect options, keeps track of your favorite newsgroups, and is easy to customize. The best thing about SPRY News is the way it decodes pictures. Suppose you want to look at a picture of a rabbit, from the newsgroup *alt.binaries.pictures.rabbits*. Just highlight a message, click on Decode, and SPRY News decodes the picture, displays it on your screen, and asks you where you want it stored. No



Qualcomm's Eudora is still the best standalone Internet e-mail program, but its competition is improving quickly. A trial version called Eudora Lite is available for free.



For keeping track of threaded conversations in newsgroups, try using **SPRY News**—it has the added benefit of being able to decode pictures on the fly.

more stripping headers, no more concatenating files, no more partial files.

BEST DIAL-UP

You can't use the Internet at all unless you're connected, and the faster your connection the better. Before Microsoft released Windows 95, you needed third-party software to dial the Internet. Now, if you have Windows 95 or Windows NT 3.51, you have a Winsock and a dialer built in.

Microsoft has implemented Winsock as a true 32-bit DLL. Everything we tried worked with it. If you're using Remote Access Services (RAS), you must have the Microsoft Winsock installed, and you're much better off using just one Winsock for all your TCP/IP needs.

If you haven't upgraded to Windows 95, you'll need a third-party Winsock and dialer. Our choice, if you must choose, is Netmanage's Winsock and dialer. It connects to every PPP and SLIP server we tried and works with every modem we've tested.

BEST BELLS AND WHISTLES

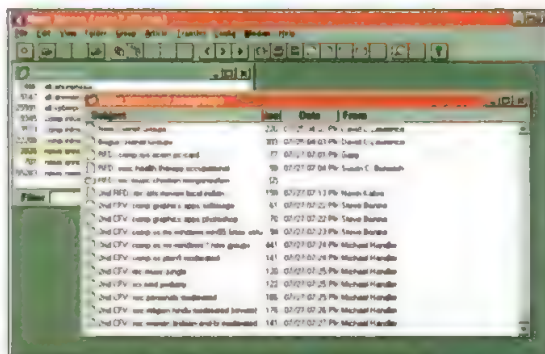
Frontier Technologies has just released a product

called **Cybersearch** that's an Internet must-have. For \$14.95, you get a CD-ROM with the Lycos search engine, a database of about 600,000 Internet sites, and Frontier's Superhighway Access browser.

Suppose you want to find all the places on the Internet that have pictures of Boeing 747s. Just run **SuperHighway Access**, the Frontier Technologies client; put your **Cybersearch** CD in your CD-ROM drive; click on either the **Navigate** or **Search** buttons, then search. You'll see a list of Internet sites that meet your search criteria.

How much does everything cost? Netscape's Web browser: \$39. Qualcomm's Eudora: \$89 (commercial version). **SPRY News** and **SPRY Gopher**, which you can get in **Internet-in-a-Box**: \$99.95. Your Winsock and dialer from Windows 95: basically free. Frontier's **Cybersearch**: \$14.95. That's a complete suite for about \$195.

If that's asking too much, there are two good substitutes for the CompuServe products. They are Ameritech's **WinGopher** for \$39.95 and the **News Xpress** news reader (it's available for free; see the sidebar "Internet Tools for Free" for details). Your total cost is now under \$135, and you've got close to the best of everything.



Another good newsgroup reader is **News Xpress**, from **Net Xpress**. It features easy-to-use nested folders and is available for FTP downloading from the Internet.

a copy of these HTML pages on its server and updates them constantly. Purchasing the package entitles you to access this on-line copy free for a year.

Ventana Mosaic features a new technology called **WebWalker**. When you are viewing the on-line copy of the **Internet Roadside Attractions**, **WebWalker** recognizes the parts that have been updated and downloads only the changes, saving you on-line time.

The Kit also contains a shareware copy of **WinVN**, a threaded newsreader that supports multiple documents and lets you read, reply to, and post messages. **WinVN** consumes a large amount of system resources, however. The newsreader is very good at decoding uuencoded binary messages and is superb with split messages. If the parts of a split message are not on the news server in order, **WinVN** will rearrange them before decoding.

The **Chameleon Sampler** provides an e-mail client, but it would probably be better to download a shareware copy of **Eudora** for Windows. The **Sampler's** e-mail client doesn't support any type of attachment, although you can include text messages. To transfer binary files you must first uuencode the file yourself and then include the uuencoded file in a mail message. Receiving binary files is equally difficult.

The message filing system is also a little weak. You can create folders easily, but managing messages can be difficult. The mail program does come with rule-based filtering.

The **Internet Membership Kit** is great for people discovering the Internet for the first time. The tools are easy to use even though they're quite powerful.

Internet Membership Kit for Windows, Version 2.0. List price: \$69.95. **Ventana Communications Group**, Research Triangle Park, NC; 800-743-5369; 919-544-9404; fax, 919-544-9472; Web page, <http://www.vmedia.com>

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SUITABILITY TO TASK

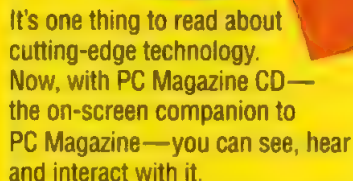
Internet Membership Kit for Windows 2.0

	Power	Ease
Installation	Fair	Good
Web browser	Fair	Good
Newsreader	Good	Good
E-mail	Poor	Fair
Other tools	Fair	Fair

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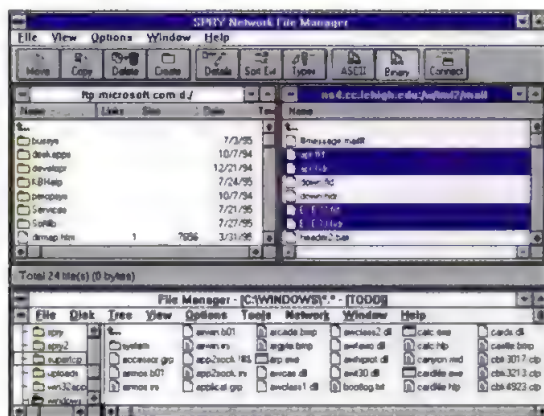
Internet Office

BY TODD FEINMAN



 CompuServe Internet Division's Internet Office, Version 4.0 (\$499) is a full-featured Internet access package. Internet Office provides full Internet connectivity through SLIP, PPP, or an existing network; it is mainly suited for connecting networked business users to the Net. This suite is well integrated, with interfaces that are intuitive and consistent.

Installation is very simple whether you are connecting through an existing network or through SLIP or PPP. Network users can use their existing TCP/IP data to configure SPRY Mosaic over the LAN; dial-up users will have to configure and create an automatic log-on to speed up the connection process. Also, there is a tracer utility for auditing your session and support for multiple connection profiles.



Internet Office's Network File Manager is an exceptional FTP client with support for multiple sessions.

STRONG BROWSER

You can't have an Internet suite without a great Web browser, and SPRY Mosaic is just that. It has full support for HTML 2.0, handles in-line JPEG and .GIF images, and integrates mail and news. You can cache sites for quick access to previously loaded pages and visit them by displaying the history window, then click on the drop-down document title list if you know the title or the drop-down URL list if you know the address.

Mosaic's categorized bookmark window, called Hotlist, can access your favorite sites quickly. You can open this window easily and add to it via the toolbar or menu bar. Corporate users can take advantage of the security features for accessing S-HTTP pages, which are secured home pages that require a log-on. Spy plans to add HTML 3.0 support to its Windows 95 version.

SPRY News is your window to the world of the Net's vast database of newsgroups and articles. You can classify newsgroups according to your own categories by a simple drag-and-drop—an

easy way to access your favorite groups without having to search through a long subscription list. Newsgroups can be sorted by any article attribute, including hierarchical threads, simply by clicking on that field. Mail is well-integrated for effortless posting and forwarding of articles. News supports multiple document interfaces and instant uuencoding.

Thanks to **SPRY Mail**, you can sort by any attribute in ascending or descending order, attach binary files via uuencoding or MIME, open multiple mail windows, view your mail in hierarchical folders, and search for a specific message.

File management is not just for local hard disks anymore: the SPRY Network File Manager integrates itself with Windows 3.x's and lets you access remote computers from it. The most amazing part is that you can have multiple active FTP sessions open for managing remote drives. If you are used to the old DOS or Unix FTP session, Office includes a character-based FTP for manually entering commands. An FTP server lets users connect to your computer and access a particular directory. The server application doesn't have many security features, but it does let you set user access rights on a directory level. Anonymous log-ons are

Internet Office 4.0

	Power	Ease
Installation	Good	Excellent
Web browser	Excellent	Excellent
Newsreader	Excellent	Excellent
E-mail	Excellent	Excellent
Other tools	Good	Good

also possible for read-only access.

Internet Office also offers several other useful tools in its bundle, such as its telnet utility, which supports nine VT emulators, plus TN3270 and TN5250.

A Gopher client called SPRY Gopher also comes in the Office bundle. Through it you can view different Gopher sites in multiple windows, and if you want to download a file whose name you already know, you can use RCP, a nonsecure file-transfer protocol.

Internet Office distinguishes itself among its competitors in this roundup by offering LPR/LPD, a network utility that lets you share remote-printing capabilities. It also offers uuencode, a utility that encode files without loading any other services.

Internet Office is an excellent suite of tools for the corporate user and is very easy to learn. CompuServe's other suite, Internet-in-a-Box (\$149), is best suited for home users or novice Internet users. It has basically the same feature set as Office except that it lacks the server programs, has fewer telnet emulators, and doesn't support the ability to connect to the Internet directly. If all you need is a World-Wide Web browser, think about purchasing Mosaic-in-a-Box (\$9.95). The Windows 95-specific browser will be released by the time you read this.

Internet Office, Version 4.0. List price: \$499. CompuServe Internet Division; Seattle, Washington; 800-777-9638, 206-447-0300; fax, 206-447-9008; Web page, <http://www.spry.com>

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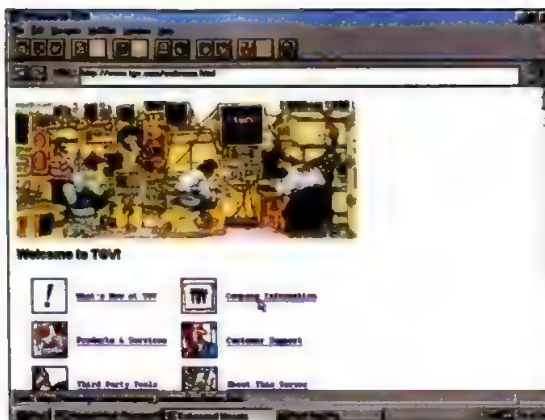
TGV Inc.

MultiNet for Windows

BY PADRAIC BOYLE

TGV's MultiNet for Windows, Version 1.1 (single user, \$400; volume discounts available), offers a full-featured TCP/IP stack with Internet applications and tools for a reasonable price. Geared to corporate use, the program is a little difficult to install, and it lacks a newsreader and a Gopher utility.

Though MultiNet for Windows includes Internet tools, it is designed primarily for LANs or WANs that need TCP/IP connections to large hosts and networked printers.



MultiNet for Windows' FTP client provides a graphical interface with drag-and-drop for easy file transfers.

Connecting to the Internet through an Ethernet or Token-Ring network is fairly simple. During the installation process, the setup program automatically detects the ODI or NDIS network drivers and configures the system accordingly. Unlike some other TCP/IP stacks, MultiNet's implementation of VxD drivers doesn't require a DOS TSR before loading Windows. To ease the installation process, MultiNet provides a wizard that walks you through the configuration of the TCP/IP stack, but the wizard doesn't entirely shield you from the stack, so you do have to have a general understanding of TCP/IP.

Unlike other packages reviewed here, MultiNet doesn't supply a list of Internet service providers, nor does it offer ready-made scripts for connecting to the Internet. You must rely on the context-sensitive online help to assist in gathering the appropriate information. TGV does plan to add log-on scripts into future releases. MultiNet supports SLIP and CSLIP for remote connections via an included dialer program. Support for PPP connections and NetBIOS are due by the time you read this review.

The Web browser, based on Spyglass's Enhanced Mosaic, supports HTML 2.0 and concurrent links for faster downloading or connecting to multiple Web sites. The menu bar lets you easily navigate through the Web browser and offers an icon linked to MultiNet Tools. On the downside, the bookmark feature doesn't offer folders to separate your favorite Web sites into categories, and it doesn't support Netscape extensions. Changing the memory cache setting can't be done from a menu; you must edit the .INI file.

The Web browser's bookmark section provides several sites of interest to choose from, including Yahoo, the White House, and the Library of Congress. From TGV's home page you can obtain information regarding other available products, as well as updates, and send e-mail to technical support.

Other applications that MultiNet offers include NFS, FTP, and telnet. The NFS client is simple to use. If you wish, you can set drive mappings to remote hosts for automatic mount at start-up. Network LPR/LPD

printing capabilities are also available.

MultiNet's FTP client comes with a File-Manager-like interface with drag-and-drop capabilities for easy file transfers. It's flexible, allowing the TCP window size to be modified to accommodate slow FTP sites.

TGV shows off its VAX experience with MultiNet's telnet application. This app supports a wide range of emulations, including TN3270 and VT320, and allows multiple telnet sessions to be open at one time (we were able to run five) with very little overhead. Most other products support only one session.

MultiNet Tools, a diagnostic application, consists of host of network utilities. The monitor portion offers information on protocol and buffer statistics, connection and routing tables, and ARP cache. The network utility programs include PING, traceroute, WHOIS, and finger. The MultiNet Tools icon is conveniently accessible from the toolbar.

Pronto Mail, MultiNet's e-mail module, has a friendly interface for sending e-mail across the Net. A basic address book lets you store alias names for lengthy addresses. Pronto Mail supports both SMTP and POP3 mail servers. MIME and uuencode or uudecode can

SUITABILITY TO TASK

MultiNet for Windows 1.1

	Power	Ease
Installation	Fair	Good
Web browser	Good	Good
Newsreader	N/A	N/A
E-mail	Good	Excellent
Other tools	Good	Excellent

N/A—Not applicable: MultiNet has no newsreader.

be used for file attachments.

MultiNet has the applications and tools you need to access much of the Internet, but it's definitely not for the stand-alone novice Internet user. If you're running a corporate network and need TCP/IP connectivity, however, MultiNet is a good choice.

MultiNet for Windows, Version 1.1. List price: \$400. TGV Inc., Santa Cruz, CA; 800-848-3440; 408-457-5200; fax, 408-457-5205; Web page, <http://www.tgv.com>.

Circle 454 on reader service card

Netscape Navigator, Personal Edition

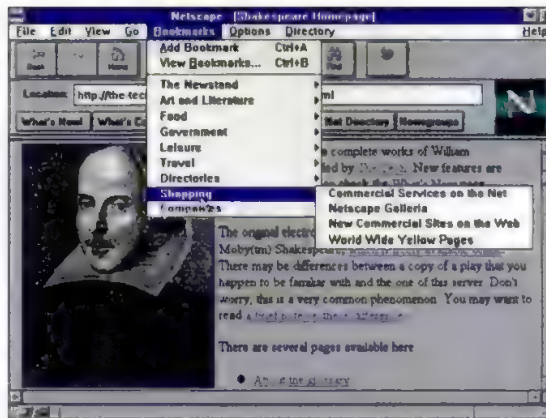
BY CADE METZ

Netscape Navigator, Personal Edition, is a Swiss Army knife among toolboxes. It performs almost as many tasks as its competitors but does so from a unified, compact architecture. With Netscape Navigator, you can access HTTP, Gopher, FTP, SMTP, and NNTP servers from the same browser.

Before using the browser, however, you must go through a slightly irritating installation process. First off, Netscape Navigator's two install options, Typical and Custom, are misnomers. A Typical installation is only for PPP access via Netscape's TCP/IP stack, while a Custom installation is for use with only a third-party stack.

After a Typical installation, the Netscape Navigator icon doesn't appear in its designated Program Manager group and won't be accessible until you sign up with an Internet service provider. Clicking on the Registration Wizard takes you to a Web site with links to three different providers: Netcom, Portal, and internet-MCI. You can make a choice and be on the Internet after a few seconds.

If you wish to use an alternate service provider, Netscape makes it difficult. First, you must find a CHAP- or PAP-type PPP



Netscape Navigator has Web, newsgroup, Gopher, and FTP support in a single browser.

account on your own (SLIP accounts are not supported). Then you must modify the configuration file for the dialer (which is set up only for the three supported account types) and manually create the appropriate icons for the Program Manager Group. Version 1.2, due soon, will offer a graphical interface for configuring an ISP account.

If you have your own TCP/IP stack, the Custom install is less restrictive. Netscape Navigator had no problem getting on-line via a third-party stack, our LAN, and our T1 link to the Internet. We tested it with both the Windows 95 stack and the Windows for Workgroups 3.11 stack with no problems. If you have your own stack, however, you can bypass the cost of Personal Edition and simply download the browser from the Netscape home page (<http://www.netscape.com>).

GREAT PERFORMANCE

Once Navigator is up and running, it performs wonderfully. Whether using a PPP or direct connection, it's far faster than any of the other browsers on the market. Should a Web page be slow to download, however, Navigator's impeccable byte and percentage indicators will keep you constantly informed of the download status. Furthermore, if you are accessing a Netscape Communications server, Web graphics will begin to draw themselves even before the entire image is in memory.

Because Navigator supports both HTML 3.0 and multiple documents, it can handle the latest in Web graphics and can open multiple windows on one machine.

Of course, Navigator encompasses more than just the Web. A newsgroup

button links to a customizable list of group subscriptions. You can access FTP sites to download files and parse Gopher servers, too. Each of these protocols is displayed in a file list format on the browser's main window. When you click on a selection and move to the next level in the hierarchy, a new window with a new list arises.

The only component of the Navigator that isn't fully incorporated into the browser is its e-mail package (it is possible to send mail from the browser).

Eudora Light e-mail is a separate icon that handles message sending and receiving. File attachments use the MIME standard, and a sending queue allows mail to be written off-line. Eudora can't load during a Custom install unless you create an icon for it, but you probably won't need it if you have your own stack.

The only base not covered by Navigator is telnet, but finding a telnet tool for Netscape's Winsock 2.0 stack shouldn't be difficult. Due to its extreme popularity, Navigator has quickly become the standard test for Winsock compliance.

Such popularity will not wane anytime soon. The beta code for the Windows 95 Navigator browser (Version 1.2) is currently available for downloading and will be a frequent complement to the stack that ships with Microsoft's new OS. It won't run on previous versions of Windows, but it does take full advantage of the Windows 95 interface enhancements.

Netscape Navigator, Personal Edition. List price: \$44.95. Netscape Communications Corp., Mountain View, CA; 415-528-2555; fax, 415-528-4124; Web page, <http://www.netscape.com>.

Circle 455 on reader service card

Quarterdeck Corp.

Quarterdeck InternetSuite for Windows

BY ANGELA HICKMAN

Quarterdeck Corp.'s InternetSuite, Version 1.0, is a slick Internet access package that includes a Web browser, an integrated e-mail and newsreader, plus FTP, telnet and PING utilities. Most users—especially novices—will find this

SUITABILITY TO TASK

Netscape Navigator, Personal Edition

	Power	Ease
Installation	Fair	Good
Web browser	Excellent	Excellent
Newsreader	Good	Good
E-mail	Poor	Good
Other tools	Poor	Excellent

in business as in sports

team work *2.5* everything

3 case studies demonstrate
how Novell's GroupWise™
delivers bottomline results



1 GroupWise
delivers

for
Domino's
Pizza
Page 28

3 Making
Nintendo

A
Winner
Page 34

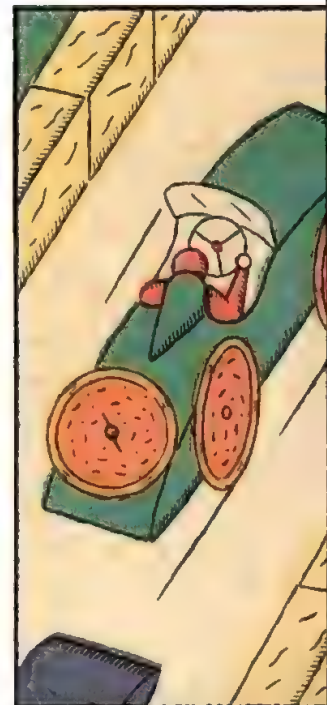
2 Nordic
Track
Stays
Trim
Page 41



“**T**

o stay competitive in business today, people need to work together as a team to accomplish common goals. To help make team work possible, Novell offers GroupWise—a messaging system that offers an ideal foundation for communication and team computing. The product saves time and money by combining enterprise-wide E-mail, personal calendaring, group scheduling and task management into a single application. With GroupWise, users can share and keep track of the vital information that helps teams work together, even when they are physically separated.

Following are stories that describe how Domino's Pizza, NordicTrack and Nintendo use GroupWise to communicate more effectively, leverage current investments in NetWare® and work together in groups.



PHILIPPE WEISBECKER

Domino's really delivers with GroupWise™ messaging

Pizza is like ice cream. When you want it, you want it now. That's why Domino's created the 12-minute carryout service guarantee—an industry benchmark. But fast is relative. When you're talking business communications—fiber optics, satellites and laser technology—12 minutes is a lifetime, several lifetimes. Today a nanosecond can mean the difference between receiving permission to franchise in China, or not. That's why Domino's, the world leader in pizza delivery, chose Novell® GroupWise™ integrated messaging system to connect its regional offices and consultants around the globe.

Instant Global Communications

"The daily sales and other accounting figures from each store are critical to every aspect of our business," said Matthew Maguire, manager of end-

user technology. "Before GroupWise, we relied on the phone and fax to receive this data. Which meant rekeying information and dealing with transposed numbers, hard-to-read faxes, data-entry errors and other data-integrity issues.

"With GroupWise, the regional office locations and consultants can send their daily reports as attachments to E-mail messages. The data arrives in seconds and can be copied and pasted into other documents, saving hours of time alone in not having to rekey data."

Group scheduling and task management are two more reasons why Domino's chose to add GroupWise to its NetWare® network instead of BeyondMail, Microsoft Mail or another messaging system. "It can take half a day to track people down to schedule a meeting," explained Maguire, "even longer if they're out of town. But with GroupWise, I can search everyone's

"No more phone tag, no more missed meetings or forgetting to include someone in a meeting"



MICHELLE ANDUNIAS

Steven Zehender, network engineer (left) and Matthew Maguire, manager of end-user technology (right) at Domino's headquarters.

electronic calendar, find a time convenient for all, then actually put the day and time of the meeting on their PCs.

"No more phone tag, no more missed meetings or forgetting to include someone in a meeting. And I can do group messaging to set up and manage projects, too. I simply type out one E-mail outlining the task, and shoot it to everyone involved. Throughout the project, group members can update each other on their progress with E-mail."

Time-Saving Features

The GroupWise Universal In Box feature holds all incoming E-mails, Internet messages, attachments, forms, appointments, notes and phone messages. Users can skim the "from" and "subject" headings to quickly find out who's contacted them and why. Attachments can be read without launching an application, and items can be forwarded from the In Box to anyone else who needs to see them.

The Out Box lets users know if recipients received the message, opened it, forwarded it or deleted it. It even lets you "unmail" mail. "I accidentally broadcast a message that was meant for one person's eyes only," said Maguire. "GroupWise let me retrieve it from my Out Box, which pulled it from everyone's PC. GroupWise saved me a lot of embarrassment."

Domino's Director of Information Services, Ken Herr, said GroupWise is the best product implemented on the network in a long time. It not only keeps him off the phone, but eliminates furious note taking during calls and the problem of filing the notes afterward. Now he has detailed electronic messages that are easy to store and manage.

Audio and Video E-mail

With GroupWise users can forward calls when out of town or set up GroupWise so that a word or combination of words in any part of the incoming message will trigger an action, such as deleting the message, rejecting it or marking it as private.

Maguire will be promoting the use of audio and video messages on GroupWise. "They're much more personal and carry more weight than a written memo. I can see widespread use of video messages, especially for executive announcements."

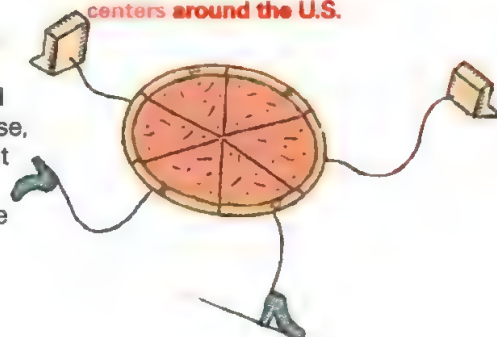
GroupWise is also helping to improve customer service. People get frustrated when their call isn't returned for two or three days. With GroupWise, a customer request can be routed directly to the person who can help, and that person can send a reply directly back to the customer. No middle man, no paper work; just responsive, real-time communication.

Thanks to GroupWise, E-mail has become the chosen method of communication at Domino's. It's completely paperless, nearly effortless and 100 percent effective. "There's no guesswork with GroupWise," stated Maguire. "You have an audit trail of who received what and when. You know if recipients opened their messages, rejected them or left a comment. So there's no more excuses either. GroupWise makes everyone more accountable."

Who knows, with the increased productivity afforded by GroupWise, Domino's just might be able to cut a little time off their 12-minute carryout guarantee—and eat up the competition.

Domino's Pizza, Inc., headquartered at Domino's Farms in Ann Arbor, Michigan, currently operates more than 5,100 Domino's Pizza stores in the United States and 41 international markets. In 1994, the company posted system-wide sales of \$2.5 billion.

Domino's enterprise NetWare network—which is currently being upgraded to NetWare 4.1—connects headquarters via frame relay to regional sites in Baltimore, Maryland; Atlanta, Georgia; Dallas, Texas; Santa Ana, California; and Orlando, Florida. The network consists of 15 Compaq Proliant servers, 450 IBM-compatible PCs and 100 Macintoshes. Domino's is in the process of rightsizing from a mainframe to a client-server environment. One IBM ES/9000 and three System 36s are currently connected via gateways to the network, but will be phased out within two years and replaced by IBM RS/6000's networked via Token Ring. The company operates 21 UnixWare® Application Servers at commissaries and distribution centers around the U.S.



For more information about GroupWise or for the nearest GroupWise reseller call 1-800-778-1850.

NordicTrack trims bottomline with GroupWise and NetWare

Rule number one in fitness training: start slowly and develop a strong foundation, then build on it. It's sound advice that NordicTrack passes along to everyone who buys its NordicTrack skier, CrossTrainer and other fitness equipment.

It's also sound business advice. Building on what you already have in place is simply smart; by leveraging your current investment, you save time, money and a lot of headaches. That's why when NordicTrack was looking to add a messaging system to their Novell® NetWare® network, they chose another Novell product, GroupWise.™

Cross-Platform Capability

"We were looking for a product that was compatible with our Novell network and provided the features, stability and performance we required," said David Janiszewski, manager of office automation services. "We checked out the leading messaging systems on the market, and chose GroupWise."

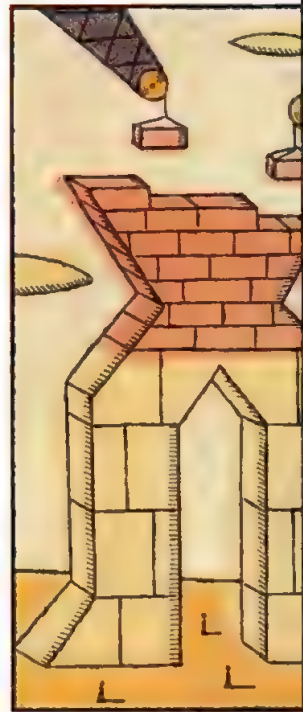
NordicTrack, headquartered in Chaska, Minnesota, operates a mixed computing environment with Macintoshes in its advertising department, UNIX machines in research and development, DOS PCs in its retail outlets and Windows everywhere else. Before GroupWise, the users could only send E-mail to people with the same computer. That meant lots of employees were spending time on phone calls, faxes and writing memos.

"We could have set up E-mail between the systems, but it would have been expensive," explained Janiszewski. "We would have had to

buy a separate E-mail application for each operating system and a separate calendaring program—we needed both capabilities. That's eight different applications. Then we'd need gateways and other hardware to send the E-mail between the systems, plus train our network technicians on the different applications, educate the users, deal with the inevitable interface problems—the more we thought about it, the more complex and expensive it became."

Feature-Rich and Easy to Install

Adding GroupWise to NordicTrack's network was simply a matter of installing a NetWare Loadable Module™ (NLM™) on each server. And GroupWise, in combination with NetWare, not only allows transparent sending of E-mail and calendaring between the four different operating systems, but provides a host of features, from group



scheduling and task management to serial routing and more.

"The resource scheduling and rules—automatic commands that each user can easily implement in GroupWise—are huge time savers," noted Janiszewski. "If I want to schedule a meeting, I press a key and a list of conference rooms, projectors and other company resources pops up. Another keystroke, and GroupWise tells me if a certain conference room is available. If so, 'click,' it's mine.

"On the other hand, if someone wants to schedule a meeting with me, they simply query my electronic calendar. I've set up rules that automatically accept the appointment—if the day and time are clear—and notify the person that I'll attend. I don't have to type and send a reply or play phone tag. I simply look at my calendar and see that I have a meeting scheduled."

Saved \$12,000 in Hardware Costs Alone

GroupWise not only saves time which means money (though in a fuzzy, hard-to-quantify way), but it also saves money that shows up on a spreadsheet. "We've seen a significant dollar saving by leveraging our NetWare investment with GroupWise," continued Janiszewski. "Licensing alone costs half of what it did. Before I had to buy an E-mail and a calendaring license for each user. Now I only purchase one. I also saved somewhere in the neighbor-

hood of \$12,000 in hardware costs by not having to purchase gateways and other equipment that I'd need to send mail between the various operating systems."

GroupWise and NetWare also affect NordicTrack's overhead by allowing them to send E-mail with attachments over the Internet to ad agencies, print houses and other vendors, saving hundreds of dollars a month in phone calls and overnight delivery costs.

"One of our longterm goals with GroupWise was Internet access," said Janiszewski. "It happened much sooner than we thought because all we had to do was set up a Simple Mail Transfer Protocol (SMTP) gateway to our Internet provider and hook that into our NetWare servers. Every GroupWise user automatically had an Internet address. We send and receive spreadsheets, graphics—you name it—around the U.S. and to our sites in England and Germany, all for the price of a local phone call."

Internet access will also benefit several other departments in NordicTrack including customer service, marketing and media placement.

When it comes to achieving fitness goals, NordicTrack understands the value of purchasing the right equipment to do the job. The same holds true when achieving fiscal goals. That's why NordicTrack chose GroupWise and NetWare to help whip their bottom line into shape.



NordicTrack, a world-class fitness and wellness company founded in 1972, develops, manufactures and sells fitness equipment and related items at its more than 200 retail outlets in the U.S., England and Germany. The company has manufacturing facilities in Belle Plaine and Glencoe, Minnesota, a distribution center in Sioux Falls, South Dakota, a telemarketing center in St. Peter, Minnesota, and an international call center in Warrick, England. NordicTrack employs 3,400 people and grossed \$455 million in fiscal year 1994.

The company's wide area NetWare network—which is being upgraded to NetWare 4.1—consists of 13 Compaq servers, 650 Compaq Windows PCs, 75 Macintoshes and six UNIX machines, plus dial-up lines to 350 DOS PCs at retail outlets. Four more servers are located at remote locations connected via T1 lines. Six IBM AS/400s are tied into the network and run NordicTrack's financial, sales and customer service databases.

David Janiszewski, manager of office automation services (center); John Pope, senior office automation analyst/CNE (right); and Dan Rivard, office automation analyst (left) of NordicTrack.

"We've seen a significant dollar savings by leveraging our NetWare investment with GroupWise"



BRUCE KLUCKHOHN

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t ain't over til it's over." In team sports—Yogi Berra's keen insight notwithstanding—it's over a lot faster if the pitcher doesn't see the sign, the wide receiver can't hear the call or the forward misreads the play. Teams that don't communicate, don't compete.

The same is true in business. Communication is key to working together to complete projects and accomplish goals, especially in large companies where players are spread around the world and communicating, at best, is difficult.

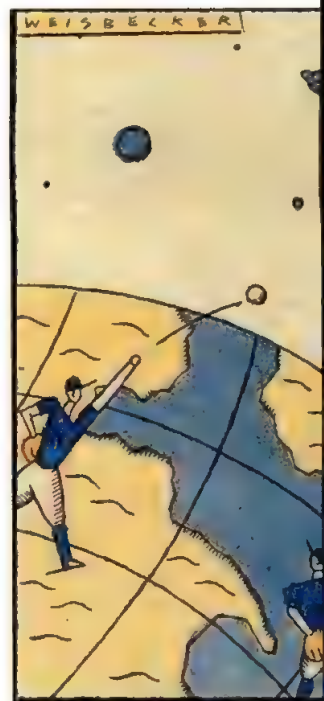
That's why Nintendo of America, a subsidiary of Nintendo Company, Limited of Japan, signed up Novell® GroupWise™ groupware software designed to make groups of people work more efficiently. Now Nintendo's employees work together in groups—smarter, better and faster.

Workgroups More Efficient, Organized

"Our work force is truly global," explained Cynthia Wilson, information services operations manager. "From our parent company in Japan to our headquarters here in Redmond, Washington, and locations across the U.S. and Europe, we have employees who need to stay in touch and work together on a daily basis. Before GroupWise, they were mailing memos, sending overnight packages, and trying to catch each other on the phone. That kind of communication was slowing us down."

Paper was a big part of the prob-

lem. In big businesses, paper is like furniture: it has to be handled, stored, moved and managed. All very time-consuming and expensive. Nintendo, the world's largest manufacturer and marketer of home-console and arcade-video games, wanted a way to end the paper chase, and GroupWise came through. "With GroupWise running on our NetWare network, we virtually eliminated the use of paper and at the same time improved the way people worked together," said Wilson. "People talk about the electronic office as something in the distant future. It's at Nintendo now. You know



GroupWise

helps Nintendo become a player
in the groupware game



Nintendo of America, Inc. headquartered in Redmond, Washington, is one of eight subsidiaries of Nintendo Company, Limited of Japan, the world's largest manufacturer and marketer of home video games. Nintendo—known for its Nintendo Entertainment System, Super Nintendo Entertainment System, Game Boy hand-held player and library of more than 2,600 games sells products in more than 20,000 retail locations across the U.S.

Nintendo of America employs more than 1,000 people and operates a wide area NetWare network consisting of 21 Hewlett-Packard servers connected to 900 IBM-compatible PCs and 12 Macintoshes. The company stores its financial, sales, customer service and other data on seven IBM AS/400s. Six UNIX RS6000 servers are connected to the network and the AS/400s, so that data downloaded from the minicomputers to the UNIX machines can be accessed by PC users.

you've arrived when major announcements like upper-management promotions are sent via E-mail."

Reps on the Road Participate in Group Projects

Physically handling and managing piles of paper reports, memos, forms and statements only slows a workgroup down. Another work stopper is phone calls and faxes. "Our merchandising and sales representatives work out of home offices and practically live in their cars," explained Wilson. "Without GroupWise, communicating across the different geographic and time zones could take up to 24 hours each way, and that's with expensive overnight express. Now, we can send just about anything we'd typically send on paper—brochures, memos, spreadsheets—via E-mail and get an E-mail reply right back. So if a workgroup needs important feedback from the field, they can usually get it the same business day."

On a larger scale, communications

between Nintendo and the other subsidiaries of Nintendo Company, Limited are faster and more error-free with GroupWise. Project teams can speed up their progress if they don't have to wait a day or two for research to arrive, and if it arrives in a readable, immediately usable format without needing to be rekeyed. Electronic text and graphics can be edited, printed or redistributed the moment they're deposited in a user's GroupWise Universal In Box. "Our daily business communications, on a worldwide basis, have improved tremendously with GroupWise," said Wilson. "Because it's so easy to use, everyone in a group can get up to speed on it fast and be more productive right away."

GroupWise Builds Business Relationships and Friendships

Before GroupWise, Nintendo was also wasting time, money and effort mailing floppy diskettes to regional sales offices and walking diskettes to other departments at its headquar-

ters campus. Now, by communicating with GroupWise, sneakernet is a thing of the past.

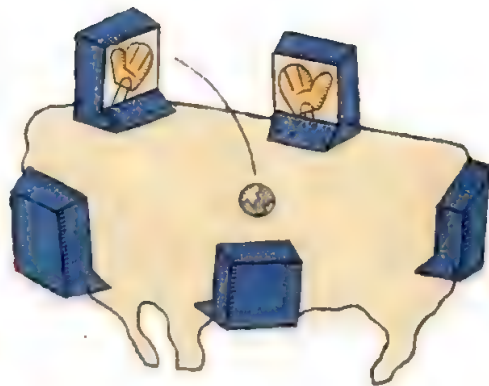
"We're saving time in dozens of different ways with GroupWise," noted Wilson. "It all adds up to huge savings. In addition, people are more productive, enjoy their jobs more, and don't get bogged down in frustrating little tasks. It really slows a project down when one or two members have to spend half an hour hunting down a fax or making sure a package gets FedExed. That time could be better spent writing their part of a report."

"We've found that GroupWise is good for morale, too, because it helps employees to know each other better, which also improves working relationships. I know people on different shifts—who never met before—who got to know each other through E-mail. I guess what I'm saying is that GroupWise is thoroughly integrated into Nintendo's corporate culture; it's made us more of a family, and at this point we couldn't live without it."

Cynthia Wilson, information services operations manager for Nintendo of America.



"Because it's so easy to use, everyone in a group can get up to speed on it fast and be more productive right away"



Other messaging systems lack important features that GroupWise has.

	GROUPWISE	LOTUS cc:MAIL	MICROSOFT MAIL
Universal In Box for all message types	YES	NO	NO
Universal Out Box message tracking	YES	NO	NO
Rules and proxies for all clients	YES	NO	NO
Integrated calendaring	YES	NO	NO
Integrated scheduling	YES	NO	NO
Integrated task management	YES	NO	NO
Shared administration with network	YES	NO	NO

Including this one:
NetWare



If you're looking to improve productivity and communications, consider GroupWise™, the messaging system from the company that defined what networking is. GroupWise offers state-of-the-art E-mail features that you simply can't get with Microsoft® Mail or Lotus cc:Mail®.

The best messaging solution for Novell NetWare.

GroupWise integrates with Novell® NetWare® 4.1, eliminating the need for you to manage your network and messaging system separately. And

GroupWise automatically synchronizes with NetWare Directory Services™ databases, saving you time and money.

Upgrading to GroupWise is easy and affordable.

If you upgrade now, you'll receive 20% off GroupWise upgrade products. Best of all, Novell is offering special Microsoft Mail, Lotus cc:Mail and OfficeVision/VM migration kits to make upgrading quick and easy. What

better time could there be to upgrade your E-mail system to a more complete messaging solution?

To get a detailed comparison guide showing you the advantages of upgrading to Novell GroupWise, simply call **1-800-258-5408**. You'll learn why GroupWise is the best messaging system available for NetWare.



GroupWise

NOVELL

ALSO AVAILABLE AS PART OF PERFECTOFFICE™

assortment of applications adequate. Both novices and experts will appreciate the easy installation and setup of the software, the ability to make both asynchronous and direct connections, and the friendly, intuitive interface, replete with big icons and colorful toolbars. InternetSuite offers flexibility and functionality without the fat.

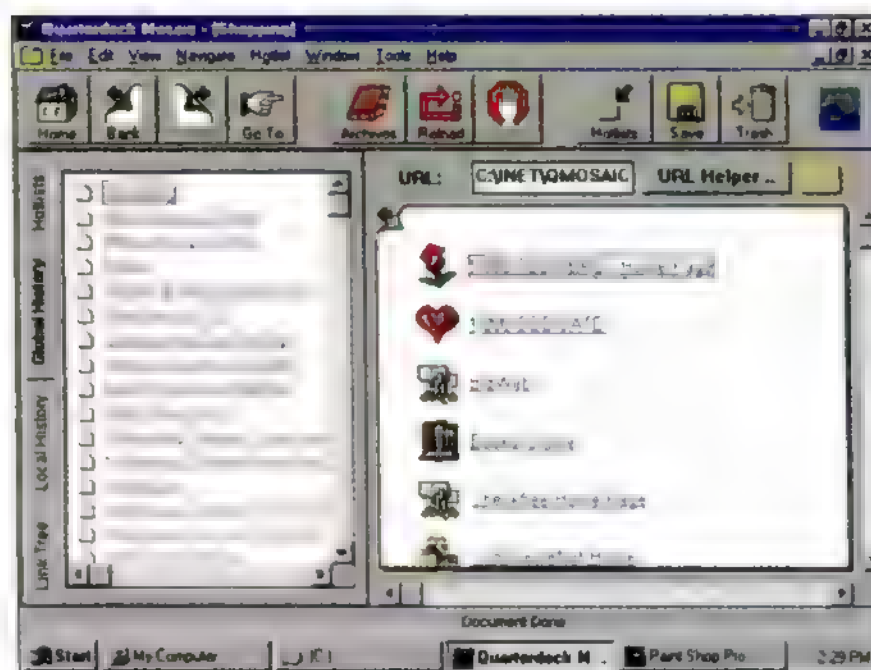
The package supports both dial-up and direct Internet access. Setting up an asynchronous account involves little more than choosing one of Quarterdeck's

Internet service provider partners like Cerfnet or Portal (there are five in all). Next, you enter your name and credit card information. If you prefer a non-Quarterdeck partner, InternetSuite's Connection Helper will provide you with all the information you need to contact any local or regional vendor in its database.

The key to dialing into the Net via InternetSuite is its proprietary Winsock DLL, Qwinsock. It supports both SLIP and PPP connections and comes with a host of log-on scripts for automated access to Internet providers.

During testing we discovered that while the Installation Reference guide says that you can easily switch between sessions using Qwinsock or another Winsock—simply by quitting any applications using one of them—we discovered that we had to reboot our system in between sessions to release the previously used Winsock from memory. This doesn't result from any limitation on the part of Qwinsock, but you should be aware that other Winsocks, including the one in Windows 95, tend to stay in memory. We also found that the dialer defaulted to auto-disconnect; hence every time we quit out of an application, the dialer shut down, too.

One way to avoid InternetSuite's Qwinsock's quirkiness is to connect to the Inter-



Quarterdeck InternetSuite's Web browser comes with a History feature that helps you revisit sites.

net through your office LAN. Except for Qping, which needs Qwinsock to run, the InternetSuite applications run well on any TCP/IP stack. You need some familiarity with domain names and IP addresses, but for the most part, setup is transparent.

Qmosiac, the Web browser, doesn't support some of the more fun features that some of its competitors do—like tables, wraparound text, and background colors and textures—but we found it to be sturdy, a direct result of its rebuilt NCSA Mosaic code.

We were able to access FTP, e-mail, and newsgroups. InternetSuite doesn't include a Gopher client, but you can access Gopher sites through the browser and FTP application. InternetSuite also has some exceptional features, such as bookmarks (called Hotlists), drag-and-drop support, annotations, and multithreading. You also have right-click access to document properties, viewer and browser configuration files, and between-session caching. Global History, a unique feature, lets you define how long documents remain stored on disk.

InternetSuite has full support of AIFF, .AU, .GIF, HTML 2.0, JPEG, .WAV, and .XPB file types internally, plus a bevy of other file types externally via helper applications. Quarterdeck plans to support the Netscape extensions in future versions.

VIRTUAL POST OFFICE

The Quarterdeck Message Center is InternetSuite's version of a virtual post office. From QMC, you can compose e-mail by cutting and pasting from the Windows clipboard, format text with rudimentary

editing tools, attach TAR or compressed files to messages, download headers, reply to a message, insert signature files, and build hierarchical folders or an address book. Another nifty feature is the ability to access newsgroups. QMC puts you just one button away from a list of ten newsgroup sites and gives you the ability to subscribe to as many newsgroups as you want. You can thread news messages and sort by author, date, subject, or topic.

InternetSuite isn't crammed with utilities you don't need for cruising the Internet. It has all the basics: a quirky, but functional Winsock; compatibility with just about any TCP/IP stack and operating system, including Windows 3.x and Windows 95; and an adequate number of tools that help make the Internet a pleasant and useful place to visit. This package takes a less-is-more approach, and it pays off in the end. **Quarterdeck InternetSuite for Windows, Version 1.0.** List price: \$79. Quarterdeck Corp., Santa Monica, CA; 800-354-3222, 310-392-9851; Web page, <http://www.qdeck.com>.

Circle 457 on reader service card

Softronic Inc.

Softerm Plus +

BY TODD FEINMAN

Softerm Plus +, Version 4.0 (\$49.95), from Softronic, is a suite of tools for users who access the Internet either by modem or through a LAN. It comes with a Winsock 1.1-compliant TCP/IP stack and can run other popular apps, but it has a minimal number of utilities: a Web browser, a newsreader, and e-mail, an FTP, and telnet clients.

Installation is simple. The software comes preconfigured for more than 100 service providers. If you type in your area code, the program attempts to find providers in your area and set up a configuration for you. There's a script editor for the experienced user and a help file if you have trouble configuring anything. If you're setting up over a LAN, there's a 12K DOS TSR that loads into memory, but Softerm Plus + configures it for you.

The Web browser can view more than one page at a time, but you can't move the pages outside the browser's border. There is support for HTML 2.0 but not for any HTML 3.0 specifications, such as dynam-

SUITABILITY TO TASK

Quarterdeck InternetSuite for Windows 1.0

	Power	Ease
Installation	Good	Fair
Web browser	Excellent	Excellent
Newsreader	Good	Excellent
E-mail	Good	Excellent
Other tools	Good	Excellent

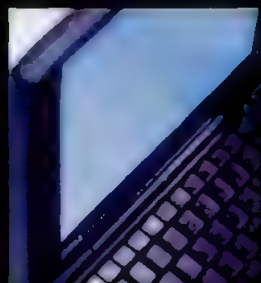
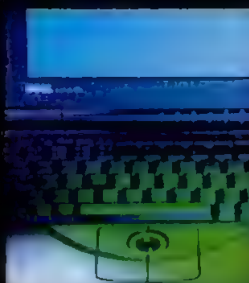
DELL LATITUDE

Dependable Notebooks
With Superior Battery Life

**IT'S LIKE
GETTING
THIS MUCH
BATTERY LIFE
IN YOUR
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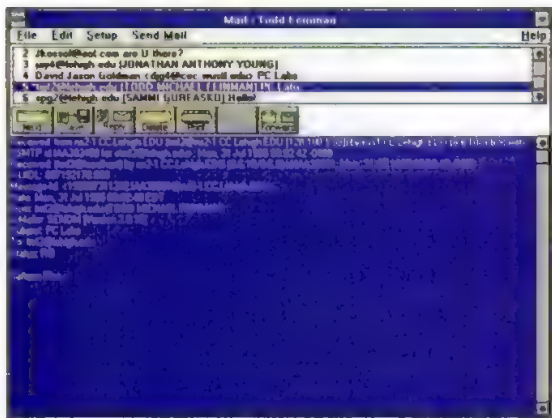
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The e-mail client included with Softterm Plus+ is somewhat cryptic and has limited capabilities.

ic documents and tables. A history window for accessing addresses previously loaded during a session and a bookmark utility for storing your favorite sites by category are included. The browser also has a search engine for quickly finding all instances of a keyword on a Web page. A cache makes revisiting sites instantaneous during a single session.

To be able to launch and configure News or Mail, you must run Internet Utilities, a floating toolbar. Unfortunately, the toolbar is bulky and gets in your way if you don't minimize it. The newsreader's interface is neither friendly nor intuitive.

As a result, it is capable of viewing only one article at a time, it has no support for sorting the news, it cannot send e-mail, and it cannot graphically display threads hierarchically. Its only good feature is that when you try to uuencode an article, it finds the other parts and decodes them all for you.

Unfortunately, the e-mail client looks exactly like the newsreader. There's no support for folders, no sorting, no receipt requests, and only single-message viewing. The e-mail client supports single-file attachments and can't handle any other MIME types besides uuencoding. If you receive a lot of mail, the view window will

quickly become cluttered and difficult to navigate.

TWO FLAVORS OF FTP

The FTP utility comes in two flavors: a graphic view that looks like a file manager and a text version that looks like a DOS window. The file manager version supports full drag-and-drop copying. You can easily navigate your way through drives and sites with nice directory-tree listings. A toolbar at the top sorts files and creates directories, and a scrollable window at the bottom of the manager lets you type commands instead of using the mouse.

Without a doubt, this suite's best utility is telnet, which is loaded with extra features not found in most telnets. You can connect to either text-only or graphical bulletin boards off the Internet and to host servers on the Internet. There are many terminal emulations and many file-transfer protocols. And you can purchase extra emulations; adding them on to your existing telnet configuration is easy.

Softterm Plus+ is a minimal Internet suite with limited tools, cryptic interfaces, and virtually no integration. Once you're well versed on the Internet, this package will restrict you and force you to upgrade to a larger suite. Look elsewhere for more complete solutions.

Softterm Plus+, Version 4.0. List price: \$49.95. Softronic Inc., Colorado Springs, CO; 800-225-8590, 719-593-9540; fax, 719-548-1878; Web, <http://www.softronic.com>.

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Frontier Technologies Corp.

SuperTCP Suite

BY DEVAL SHAH

Novice users should think twice before attempting to install Frontier Technologies Corp.'s SuperTCP Suite, Version 1.1. This program is geared towards businesses that have a network administrator or an expert to set up programs for end users. SuperTCP Suite provides multiple TCP/IP stacks for a LAN and modem-based connections to the Internet. It comes with a Web browser, a newsreader, and an e-mail client, but many of the modules need improvements,

some of which are promised for the next version of the product.

SuperTCP Suite offers various implementations of the TCP/IP stack. It can connect to the Internet using NDIS, ODI, packet drivers, and ASI interfaces using any TCP/IP stack for a LAN connection; and it offers SLIP/PPP protocols for your modem. The program can also be installed easily over any existing stack. Its Winsock is fully Winsock 1.1 compliant, and the program also has an application, SetupTCP, that sets TCP settings.

SuperTCP Suite's installation is intimidating, even for experienced users, since you have to gather up all the required information, such as host name, IP address, and DNS address. You can perform several types of installations; the most complete one lets you use an icon to switch from a LAN to a dial-up connection.

During our testing, some of the program settings required manual adjustments to make successful connections. SuperTCP Suite doesn't have a manual dialer, so you're forced to write a script. SuperTCP presents a broad list of supported service providers, and it gives you the information in the form of a map. You just click on your region to get the appropriate details.

FRIENDLY BROWSER

SuperTCP Suite comes with a user-friendly Web browser, SuperHighway Access, that's notable for its extensive bookmark features. The Internet Organizer, as it's called, comes with many Gopher, FTP, and Web sites listed within tabbed categories, and adding new categories is a breeze. SuperHighway Access also has its own Gopher client, and it launches separate telnet, FTP, TN3270, and CSO applications from within the browser. Currently, WinTapestry supports only HTML 2.0, but according to Frontier, Version 1.2 of the program will support HTML 3.0.

SuperHighway Access handles only 16 graphic formats including JPEG and .GIF

SUITABILITY TO TASK

Softterm Plus+ 4.0

	Power	Ease
Installation	Good	Excellent
Web browser	Good	Fair
Newsreader	Fair	Poor
E-mail	Poor	Poor
Other tools	Good	Good

SUITABILITY TO TASK

SuperTCP Suite 1.1

	Power	Ease
Installation	Good	Fair
Web browser	Good	Good
Newsreader	Fair	Poor
E-mail	Fair	Good
Other tools	Good	Good

graphics files, but it doesn't support Netscape extensions. Version 1.2 of the program, scheduled to be released by the time you read this, will support increased multimedia capabilities including the extensions.

The newsreader module of SuperTCP Suite is bare-bones and cumbersome. Its sorting capabilities are almost non-existent (the sorting is done only by the number an article was assigned when it was posted). You can search for an article only if you know its name and location. SuperTCP Suite also lacks

threaded newsgroup reading. Frontier says that Version 1.2 will improve the newsreader by giving it more powerful searching and sorting capabilities, and the ability to thread news messages.

The e-mail module supports SMTP, POP2, POP3 and MIME file attachments. It has rule-based sorting of incoming mail within hierarchical folders. If you're globally logged in, it notifies you when you



SuperTCP Suite comes with an impressive variety of Internet apps, including the Internet Organizer.

have received new mail. The incoming messages can also be sorted by date, author, and subject. You can't extract the e-mail address of the sender to your address book, but adding new names to the address book is very simple.

STRONG FTP CLIENT

The FTP client is the best application in the suite. While using it, you can choose

between an interface similar to File Manager or a more traditional command line interface called expert mode. The only flaw with the FTP client is that it can't distinguish between ASCII and binary files; the default transfer mode is ASCII.

SuperTCP Suite comes with some tools that allow Unix connectivity. Using an NFS driver you can use File Manager to mount NFS drives, and an included NFS server lets other computers mount your drives as NFS drives. The suite also comes with XServer so that X Window applications can have access to your screen for direct output.

SuperTCP Suite's support for other Winsock products and its ability to set up several kinds of Internet connections are its greatest assets, but we recommend that you wait for the improvements promised in Version 1.2. □

SuperTCP Suite, Version 1.1. List price: \$595. Frontier Technologies Corp., Mequon, WI; 800-929-3054, 414-241-4555; fax, 414-241-7084; Web page, <http://www.frontiertech.com>

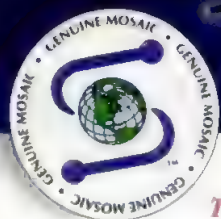
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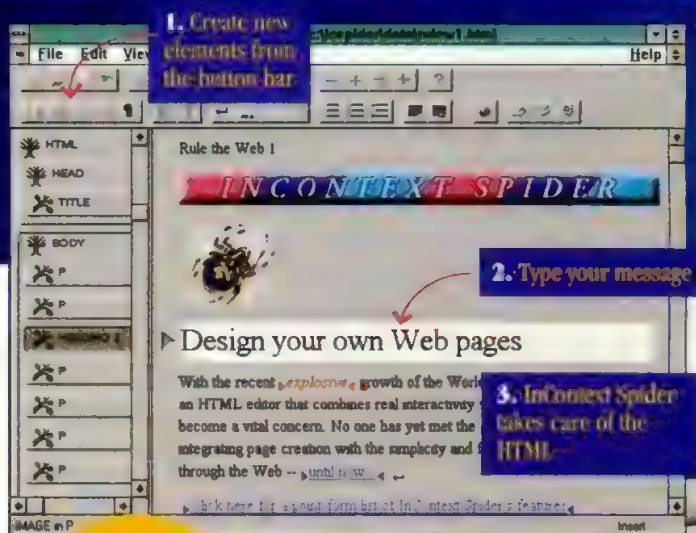
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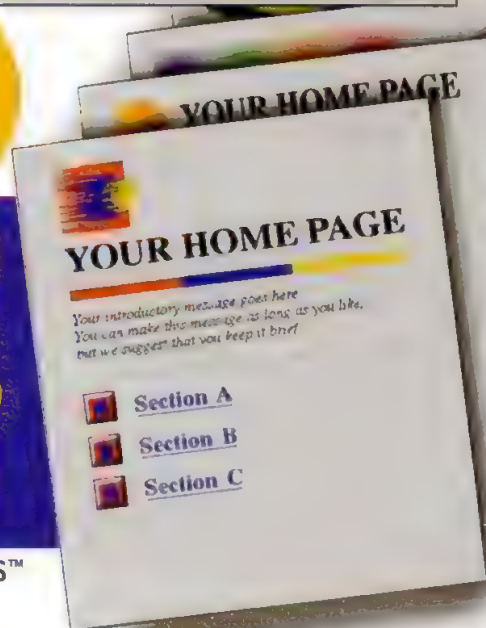
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CIRCLE 340 ON READER SERVICE CARD

PUBLISH TO THE WEB

No Experience Required

HTML is the tool you need to turn your documents into Web pages, and these days you don't even have to leave your word processor to use it.

By Edward Mendelson



If you want to get your message out on the World-Wide Web, you have to use the Web's native language, Hypertext Markup Language, or HTML. Virtually every

Web page that you see when you explore the Internet with a Web browser is an HTML document that consists of text and HTML codes that define the way the text will look. More complex codes create other formats; tell the browser where to find inline graphics (images woven throughout the HTML document text) and hyperlinked files; provide information to Web-crawling search software that indexes Web pages; or create forms that let you send data back to the author of the file.

If you want to publish your own pages on the Web, you'll either need to learn HTML or find an editor program that generates HTML files for you. Because HTML consists entirely of the standard ASCII characters that you can type on your keyboard, you can use any text editor—such as Windows' Notepad—to create valid, full-featured

IN THIS REVIEW

HoTMetal PRO 2.0	205
InContext Spider 1.0	207
Internet Assistant for Microsoft Word for Windows	211
WebAuthor	218
WordPerfect Internet Publisher for Windows	218

COVER STORY

HTML-Editing Software

Suitability to Task

HTML-Editing Software

Although the list of HTML codes still remains relatively short, today's HTML-editing tools must still provide clear direction on how to insert them in a consistent and error-free way.

To rate well in the Power component of our Basic editing task, editors should be able to insert all standard text, character-attribute, and list tags in a single step and make it easy to change one tag to another and to modify existing tags. All HTML 2.0 tags should be supported for a rating of good, and a full complement of HTML 3.0 and Netscape extensions should be supported for a rating of excellent. Products should make all tags accessible from point-

and-shoot dialog boxes to receive a rating of good; the addition of intelligent toolbars and automated tag insertion also figure into a high rating for this task.

To garner a Power rating of excellent on our Tables/forms task, editors should be able to create HTML 3.0 tables with full character and cell formatting, and all form elements. Products that rate good provide support for forms only, or for tables in the form of preformatted text only. We rate Ease by

SUITABILITY TO TASK		
Product Name	Power	Ease
Basic editing	Good	Fair
Tables/forms	Poor	Poor
Links	Excellent	Excellent

looking at whether table editing is entirely graphical and lets you make custom adjustments in a dialog box. To rate highly in this task, editors should create forms via menus that guide you through the steps needed to produce each element.

To earn a Power rating of excellent on our Links task, editors have to be able to create links to documents and graphics from a hotlist of remote and local pages, and to include support for advanced HTML codes used in controlling links. An Ease rating of excellent means that an editor can create a link to a remote World-Wide Web page when you simply point and click on the page in a browser, and that the product can confirm a link without manually exporting and testing the file. Also desirable are directory listings of local files so that you don't have to type or paste the name by hand.

HTML files. You can also use EDLIN as your word processor, but you'll almost certainly find an HTML editor easier to use. In this story, we evaluate commercial, shareware, and freeware HTML editors in two basic categories: specialized standalone editors designed to produce only HTML codes, and word processor add-ons that let you create HTML documents by using the same program that you use for letters, reports, and every other traditional document.

TWO WAYS TO CODE

Many HTML features—such as fill-in forms, drop-down boxes, check boxes, radio buttons, hyperlinks to files, and graphics divided into regions that respond in different ways to a mouse click—have no direct counterpart in most word processing documents. Even with only moderately advanced features, an HTML file can resemble a computer program more than a document. A word processor add-on designed to generate HTML inevitably makes compromises when dealing with “live” features. Either the add-on uses an unfamiliar interface and sacrifices the familiarity of the word processor's standard interface, or it makes you jump through hoops to force the interface to generate the kind of code it was never designed for.

Standalone HTML editors have the advantage of being designed without compromises, but the disadvantage of making you learn an entirely new interface. Word processor add-ons generally keep all HTML codes hidden so that you

never have to see the codes at all, while standalone editors generally keep the codes visible. At this stage in the development of HTML, it's probably an advantage to see—and learn—the codes that make up HTML, but the sight of those raw codes may remind you of the bad old days of WordStar, when word processors displayed underline and bold codes instead of actually underlining or boldfacing your text.

Even though these editors shield you from most raw HTML code, you'll need to know a few terms before you start. A URL, or Uniform Resource Locator, is the Internet equivalent of a pathname on your hard disk. The URL <http://www.zdnet.com/~pcmag/> tells your Web browser—the program that you use to view Web pages—to use the HTTP protocol (Hypertext Transfer Protocol) to read the page named `/~pcmag/` at the www.zdnet.com server. Most URLs on a Web page are hidden behind highlighted text that serves as a link. When you click on a link in a browser, the browser makes contact with the site named in the URL.

The HTML specification is constantly under development, and HTML browsers and editors tend to be widely available in a series of prerelease versions being issued almost constantly in order to keep pace with new developments.

A LEVEL PLANE

HTML 2.0 is the minimum level currently supported by browsers and editors. This version of HTML includes text, linked

graphics, hyperlinks to other files, and fill-in forms. HTML 2.0 does not support fully formatted tables, although it can imitate the look of a table by displaying text divided by spaces, so that the text is arranged in columns. Full table support—part of the proposed HTML 3.0 specification—is already supported by many browsers, and you should probably expect to find similar support in the HTML editor you choose. (See the sidebar “What's Next on the Web?”)

For this story, we tested each editor for the ease with which it lets you create formatting, hyperlink, graphic, and form features included in the HTML 2.0 spec, and we also looked for support for widely used features found in version 3.0 and other extensions to HTML. We also tested each program's ability to import existing HTML files based on the 2.0 and later specs, and existing files in standard word processing formats. Some editors include a feature that checks imported or exported HTML files for conformity with the HTML specification, so that you can be confident that they will display correctly in a browser; we tested this error-checking feature for accuracy and speed.

In addition, we tested each program's ability to validate links and to let you see how your file will look in a variety of actual Web browsers. Files look different in every Web browser—and their appearance can be further modified by individual browser users—so there is no HTML equivalent of a Print-Preview mode.

Both categories of HTML-editing pro-

grams—standalones and add-ons—will probably tend to disappear over the next few years. HTML editing has become so important that word processors will evolve to the point where they work as effectively as standalone HTML editors, just as they evolved in the 1980s to incorporate the outlining features that had formerly been available only as standalone and add-on outlining software.

Word processors have begun to evolve into HTML editors, but the first steps in this evolution involve slightly awkward add-ons. Other programs have moved along the same line. FrameMaker 5.0 already exports HTML output, PageMaker 6.0 will use a plug-in for HTML export, and you can expect similar features in QuarkXpress and other desktop publishing packages soon. Meanwhile, any of the products reviewed here can produce the HTML files that get your message out to the millions of users of the World-Wide Web.

SoftQuad Inc.

HoTMetaL PRO

ALL REVIEWS BY EDWARD MENDELSON



If you're serious about publishing on the World-Wide Web, SoftQuad's \$195 HoTMetaL PRO 2.0 is the program you need. This rich and powerful package isn't for casual users, but if you need to produce consistent HTML pages and you're willing to learn advanced HTML, you won't find anything better. Unlike word processor add-ons—which attempt to create structure-based HTML documents using software designed to create format-based documents—HoTMetaL PRO is based on SoftQuad's structure-based SGML (Standard Generalized Markup Language) software. Every function in the package is designed to create error-free, highly customized HTML code.

HoTMetaL PRO is a complete and uncompromising HTML document processor, with all the power you've learned to

HoTMetaL PRO

HTML is only five years old, and most HTML-editing software hasn't had time to reach maturity. The

dazzling exception to the rule is SoftQuad's HoTMetaL PRO 2.0, which combines the editing power and ease of use of an advanced Microsoft Windows word processor with unique features designed especially for generating and testing HTML files.

HoTMetaL PRO surpasses all other HTML software at virtually every stage of the editing process. You can begin by importing existing files in virtually every known word processing format. Or you can use one of the program's many customizable templates to establish a consistent look for newly created files. Full support for nearly all the latest not-yet-official HTML features is built in, and the program is designed so that SoftQuad can easily add support for newer features by upgrading a single file. At every stage of editing, you can preview your work in all the World-Wide Web-browser software that you keep on your hard disk. And when you're finished, the program converts references to local-disk files into URLs that refer to the Internet addresses on your Web site.

This is a package for professional, high-volume use, and it demands some

expert understanding of HTML if you want to use it to its fullest. Unlike Quarterdeck Office Systems' add-on for Microsoft Word for Windows—WebAuthor—HoTMetaL PRO won't walk you through the process of creating HTML forms, which readers of your pages can then use to send data back to you, to a search engine, or to other server software. If you know what you're doing, you can create any imaginable HTML form with HoTMetaL PRO, but the program doesn't make the job easy.

For more casual HTML editing—or if you can't imagine writing in anything except Word for Windows—two choices are Microsoft's Internet Assistant, which has the advantage of being free for the download, or Quarterdeck's WebAuthor. Both these add-ons are a mixture of strengths and weaknesses. Internet Assistant feels more like Word itself and transforms Word into a Web browser, although a second-rate one when compared with Netscape. WebAuthor has a less familiar interface, but it holds your hand through complex processes such as forms creation and it error-checks the HTML code that it imports and exports.

MetaL PRO doesn't have a WYSIWYG preview mode, but with a few keystrokes you can preview your files in any or all of your Web browsers. When you're ready to publish your files, it automatically converts the pathnames of local files into standard URLs.

HOT STUFF, INDEED

HoTMetaL PRO never lets you forget that you're creating a structured HTML file, not a word processing document. The editing window displays HTML tags in shaded boxes around your text, although you can hide the tags for a quasi-WYSIWYG view. All functions are accessible

Our Contributors: EDWARD MENDELSON is a contributing editor to *PC Magazine*. JIM COLLINS is an HTML consultant living in Washington, D.C. (collins@nova.umuc.edu). LANCE ULANOFF was the associate editor in charge of this story, and JEFF MACE was the project leader.

Basic editing	Excellent	Excellent
Tables/forms	Excellent	Good
Links	Excellent	Good

206 PC MAGAZINE OCTOBER 10, 1995

COVER STORY

HTML-Editing Software

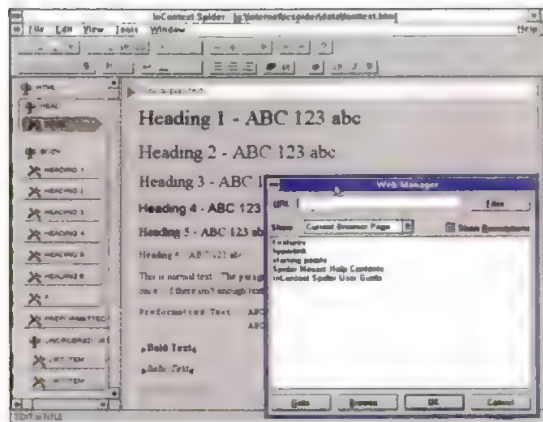
InContext Systems

InContext Spider

No one who edits HTML files will have neutral feelings about InContext Systems' \$99 InContext Spider 1.0. Most users will be dazzled by its interface, which displays the logical structure of an HTML file in one window and text and images in another, and also by its effortless imports of text and links from remote pages through its close interaction with a browser.

Like SoftQuad's equally structure-oriented HoTMetaL PRO, InContext Spider is based on a SGML editor: the package called InContext, marketed by Xsoft.

The interface is split into two parts: The logical editor on the left-hand side displays the document in the form of but-



InContext Spider's Web Manager dialog box imports one or more links directly from the Mosaic browser.

tons, and the content editor on the right-hand side displays the document in approximately the form in which it will finally appear on the World-Wide Web.

The logical editor offers unmatched convenience in editing HTML structure. You move, delete, or copy an entire button (representing a tagged element) simply by clicking on it and using Windows' standard keyboard shortcuts. You change

a tagged element by selecting it and clicking on the toolbar button that represents the new style you want it to adopt. To insert a new tagged element, you click between two existing buttons (on the far-left edge), but if you click slightly too far to the right, you select every icon instead of inserting a new one. You'll have to learn through trial and error where to click, because the program offers no visual clues.

In the content editor, the current element is highlighted, and you apply character attrib-

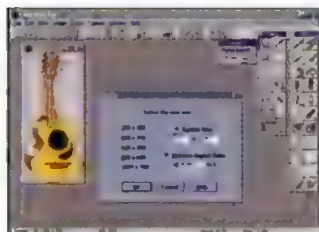
utes by selecting text and then opening a pop-up menu listing the available attributes. Once you get past the program's interface, menus like this are plain and overly laconic, and if you don't know HTML well, they'll often seem puzzling.

When you build a form, you have to construct each field from an obscure menu, and if you want to change a field after creating it, the field is difficult to pin

SUITABILITY TO TASK

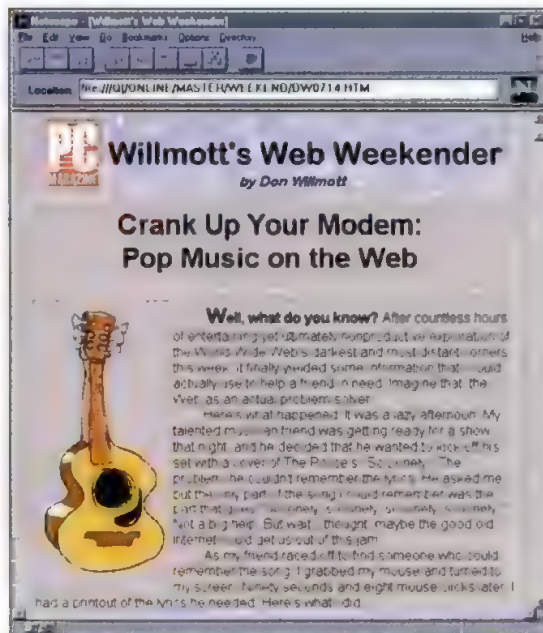
InContext Spider

	Power	Ease
Basic editing	Good	Fair
Tables/forms	Poor	Poor
Links	Excellent	Excellent

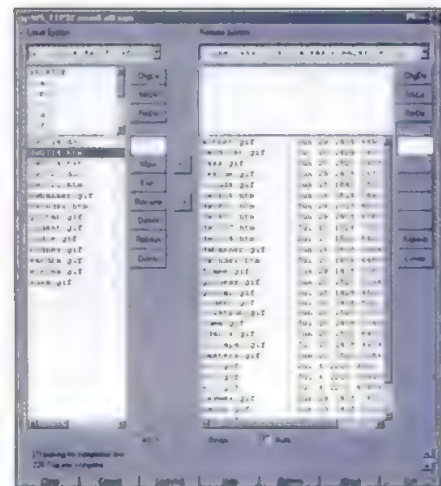


4. We convert all the graphics to .GIF format, the Graphics Interchange Format commonly used by Web browsers. We size the files appropriately in Paint Shop Pro (above).

5. We use Giftrans (below), a DOS-shareware program, to give the graphics transparent backgrounds. By indicating a color on the graphic that matches the browser background, the image appears to float in the document instead of appearing in a box.



6. We check the Web page's links and layouts in a variety of browsers, such as Mosaic (left), Netscape, and those available through America Online and Prodigy.



7. Using FTP (File Transfer Protocol) software, such as the shareware package WS_FTP (above), we transfer the files and appropriate graphics to PC Magazine's World-Wide Web server.



© 1995 Intel Corporation. The 63-MHz Pentium OverDrive processor for most 50-MHz and 25-MHz Intel486 CPU-based systems is available now. The 83-MHz Pentium OverDrive processor for most 66-MHz and 33-MHz Intel486 CPU-based systems ratings are for processors running in write-back mode. i486™ processor-based systems supporting the write-through mode will yield approximately 15% lower iCOMP index ratings when upgraded with the Pentium OverDrive processor. *Other trade names.

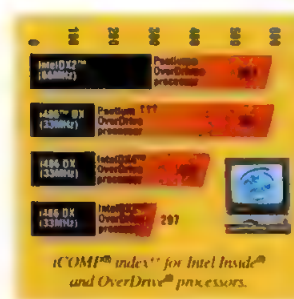
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will be available in September, 1995. ^{††}Source: iCOMP[®]. A Simplified Measure Of Relative Microprocessor Performance. Intel Corporation, 1992. ^{†††}Pentium OverDrive processor iCOMP referenced are the property of their respective holders.

Drive[®] processor upgrade.

intel[®]

HTML's First Lesson: Shareware and Other Useful Tools

By Jim Collins

Along with the explosive growth of the World-Wide Web has come a plethora of HTML-editing tools designed to make creation of Web documents easier. In this article we look at several of the many freeware and shareware HTML add-ons that have recently become available.

In the case of freeware, no payment is required; with shareware, you must pay a nominal fee if you like the product and continue to use it. Often you can make a payment by submitting your credit-card number to the publisher's Web site (also listed below).

BASIC HTML

If you're a casual user who simply wants to create a home page, you can do so *without* a word processor. Just fire up your Web browser and visit The Instant Home Page site (<http://banjo.cise.nsf.gov/ihp/ihp.html>). It lets you type in the information needed to create a home page, including links to other pages and images, and the completed form is then saved to your computer.

A step above that is Web Wizard (<http://www.halcyon.com/webwizard/>), a Windows application that walks you

through the process of creating a home page without ever exposing you to a single line of HTML. Using prompts such as "Would you like to add a paragraph of text to your Web page?" and "Perhaps you might like to introduce yourself," Web Wizard walks you through page creation, letting you add images, backgrounds, and other features.

GETTING INVOLVED

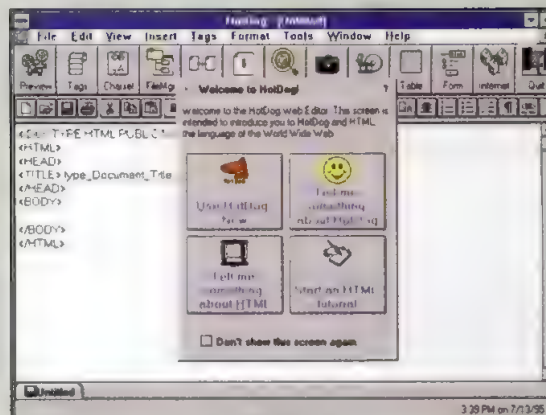
At the other end of the scale, two products stand out as full-featured HTML editors able to support the most demanding requirements. They are HotDog (<http://www.sausage.com>) and <Live Markup> (<http://www.mediatec.com/mediatech/>).

HotDog is a well-designed product that has gotten an enthusiastic reception in the Internet community because of its robust editing features.

HotDog offers context-sensitive and pop-up help, an introduction to HTML, an HTML tutorial, support for Netscape 1.1 extensions and proposed HTML 3.0 features, dialog boxes to create forms and tables, and almost 50 user-config-

urable options (such as whether to use relative or absolute file references). At press time only a 16-bit version was available, but a 32-bit version is planned, as well as an enhanced version called "HotDog Professional," which should feature support for unlimited file sizes and a built-in spell-checker.

The other standout HTML editor, <Live Markup>, offers a unique feature among the products we reviewed: It's WYSIWYG. No HTML editor can truly be WYSIWYG because



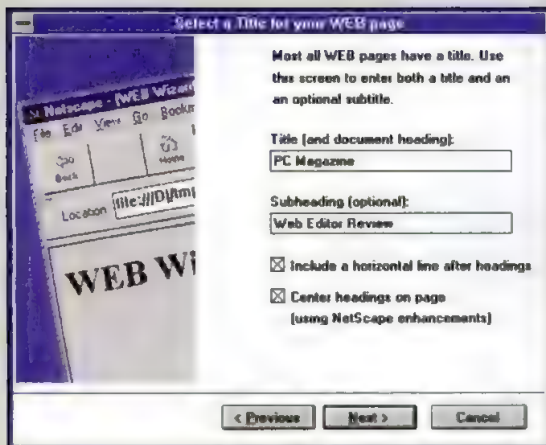
HotDog offers an on-line HTML tutorial or, alternatively, "The HotDog start-up screen."

each Web browser is going to represent a document somewhat (or in some cases more than somewhat) differently. <Live Markup>'s ability to let you view images within the editor and get an idea of what the saved page will look like is certainly a step in the right direction, however. <Live Markup> also supports the ability to use the right mouse button to add tags and links. The only problem with <Live Markup> is that you can't turn the WYSIWYG off, so there's no way to access the HTML code directly. The author states that future versions will have this capability.

<Live Markup> also lacks support for Netscape enhancements such as <blink> (blinking text). Support for HTML 3.0, including tables, has been promised for future versions.

Several other editors are worthy of mention. Although they don't have the ease of use of Web Wizard or the bells and whistles of HotDog, they are no-nonsense editors that perform equally well.

HTMLWriter (<http://lal.cs.byu.edu/people/nosack/>), a freeware package, has a reputation on the Internet as a good editor. It has drawn praise for its drag-and-drop editing, multiple windows, use of the right-mouse button,



Web Wizard walks you through the creation of a home World-Wide Web page.

HTML-Editing Software

and its URL-building capabilities.

Another popular editor is WebEdit (<http://wwwnt.thegroup.net/webedit/webedit.htm>). WebEdit supports proposed HTML 3.0 extensions and Netscape extensions and uses the tag names in its menus, which is great if you don't remember the HTML code for a particular operation.

USE WHAT YOU HAVE

Other freeware and shareware packages are geared toward generating HTML files from existing software. Microsoft, Novell, and Quarterdeck Office Systems have released professional-level word processor add-ons (reviewed elsewhere in this feature), but the freeware or shareware tools are still worth looking at in case their toolbars and procedures suit your needs better than the higher-powered products.

Among many add-ons available for Microsoft Word for Windows 6.0, two stand out. One is HTML Author, which supports some proposed HTML 3.0 features. It's available from <http://www.salford.ac.uk/docs/depts/iti/staff/gsc/htmlauth/summary.html>.

The other is SGML Tag Wizard, which generates both HTML and SGML code. You can find it at <http://www.w3.org/hypertext/WWW/Tools/tagwizard.html>.

A highly effective set of macros for exporting HTML code from WordPerfect for DOS 5.1 and 6.0 can be found at <ftp://oak.oakland.edu/SimTel/msdos/wordperf/wpt51d10.zip>. Version 6.0 includes table support not found in Novell's prerelease version of WordPerfect Internet Publisher for Windows.

New HTML editors and upgrades are constantly emerging. The best way to keep up is through a service called Yahoo (http://www.yahoo.com/Computers/World_Wide_Web/HTML_Editors/MS_Windows/) which is an excellent way to find almost anything on the Web.

down as a selection unless you use an expanded view that makes the appearance of the form difficult to visualize.

When you launch InContext Spider, it loads Spider Mosaic, a licensed version of the Spyglass Enhanced Mosaic Web browser, which comes in the package. The editor uses the browser for previewing, and toolbar icons in the editor let you import any page currently in the browser. A separate menu lets you copy links from a page in the browser to the editor. Neither the browser nor the editor supports many features beyond those in the HTML 2.0 specification.

InContext Spider can import HTML 2.0 files, but its import validation is excessively stringent. HTML files created by many other editors won't import, and many pages that you can display in Spider Mosaic won't import into the editor. As a first release of an innovative product, InContext Spider is packed with promise, but you may want to wait for a later version before you make it your workhorse HTML editor.

InContext Spider 1.0. List price: \$99. Requires: Microsoft Windows 3.1 or later. InContext Systems, Toronto, Ontario, Canada; 800-263-0127, 416-922-0087; fax, 416-922-6489; Web, (<http://incontext.ca/articles/webware/control1.html>)

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Microsoft Corp.

Internet Assistant for Microsoft Word for Windows

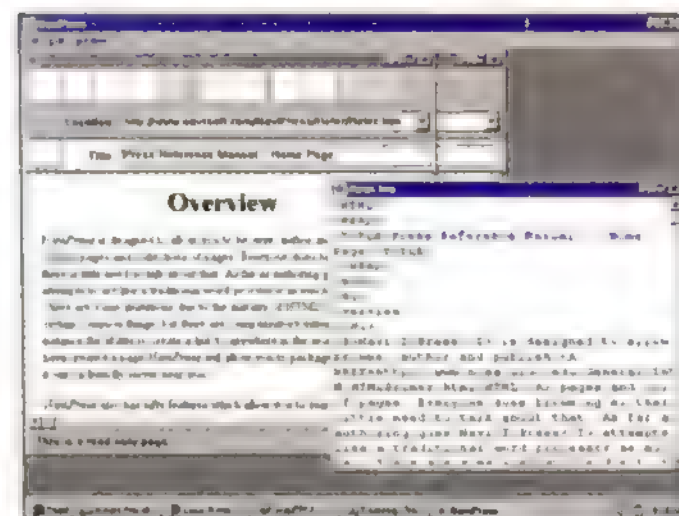
Internet Assistant for Microsoft Word for Windows combines a brilliant idea with a slightly less-than-brilliant execution. The idea behind Microsoft's no-charge add-in for Word 6.0 is that you should be able to browse the World-Wide Web in the same program you use to create Web pages. So Internet Assistant transforms Word into a Web browser as well as an HTML editor. While you write an HTML document in one window of Word, you can browse documents on remote sites in other windows. You can also build links between your page and any remote page, or copy text from the remote page to yours.

This integration of editor and browser brings significant benefits. You can switch between WYSIWYG browsing mode and editing mode by clicking an icon. In other editors, when you click on a link you see nothing more than a box that displays the URL of the intended target but you don't get any confirmation that the target exists. In contrast, Internet Assistant jumps directly to the local file or remote site you specify, so you can check the link.

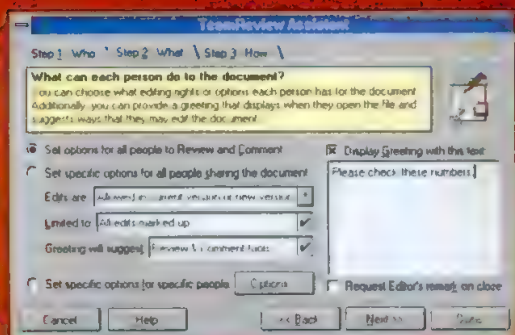
Under Construction: NaviSoft's NaviPress

Although not finished in time for this review, NaviPress, the Windows-based HTML editor from NaviSoft (a subsidiary of America Online), priced at \$99, should be shipping by the time you read this. You can download the software (pictured at right) from NaviSoft's FTP site (<ftp://aol.com>), or by visiting its World-Wide Web site (<http://www.navisoft.com>) and registering with the company. The product will also be available in Macintosh and Unix versions.

Even though the icons for the button bar were clearly not yet finished, the application did function, and we were able to create a simple HTML document via the product's basic point-and-click, style-sheet-based tagging system. We even added a number of URL links via the built-in browser. NaviSoft has also announced plans for NaviService, a Web hosting bureau that will be available to all NaviPress users.



The prerelease version of NaviPress shows an unfinished, yet functioning, interface.



Team Review lets everyone have a say, while still allowing you to control editorial access.

Ever watch someone review a document? With one hand, they pick up the document. And with the other hand, they pick up a pencil. By the time a half dozen or so people go over the same document, you have more copies and more input than you know what to do with. Okay, everyone. Pencils down.

Introducing Lotus Word Pro 96. Now, there's no longer the need to have people mark up hard copies of documents. No need to manually compare all the comments and suggestions you receive. With the Team Review™ feature of Lotus Word Pro™ 96, you can



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specify who can edit your document, what they can do to it, even how it's distributed. You maintain complete control. Then, you can view everyone's edits on one screen, simultaneously, and decide which ones to accept and which to reject. It's easier, it's faster, and it eliminates errors.

With Ask The Expert, a feature that allows users to ask for help in their own words. With a Spell Check that highlights misspelled

All right, everybody. Pencils down.

words all at once and as they're typed. With Divider Tabs to easily organize and manage long documents. In short, Lotus Word Pro 96 is the first word processor that adapts to the way people work.

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In Canada, call 1-800-430-LOTUS. *Mail in your coupon to receive your free copy of Word Pro 96. Shipping and handling charges apply. †Limited time offer. (Upgrade only. Lotus Word Pro 96 will be available for Windows 3.1, Windows 95 and OS/2. © 1993 Lotus Development Corporation, an IBM subsidiary, 35 Cambridge Parkway, Cambridge, MA 02142. All rights reserved. Lotus, SmartSuite and Working Together are registered trademarks and Word Pro and Team Review are trademarks of Lotus Development Corp.

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TELEPHONE
813/555-1806
FAX
813/555-3522

September 30, 1995

Mr. and Mrs. Arthur Sweetser

126 Squires Road

Marco Island, Florida

zip?
33969

Dear Arthur and Cindy,

Arthur's on vacation
until Oct. 15 - date it
+ send late that week.

I have reviewed your estate plan ^{with Rebecca} as reflected in your present Wills and the schedule of assets that you left with me. My comments and suggestions follow.

recently

Your present Wills provide the desired flexibility to determine after the first death the amount of marital deduction to be utilized in order to achieve the best federal estate tax result. A problem arises, however, by reason of the way you presently hold ^{COMBINED} assets. In the event Arthur is the first to die, his two IRAs and Annuity would pass to pursuant to the beneficiary designations in place, leaving no assets with which to produce a taxable estate and utilize any of Arthur's available unified credit. While there will be no federal estate tax payable on Arthur's estate, the tax in Cindy's estate may well be higher than it needs to be by reason of the failure to use Arthur's unified credit.

attach
design-
nation

Can we insert a table here?

To illustrate the foregoing, using the values contained on your Schedule of Assets, and assuming Arthur dies first and that Cindy dies one year later with no change in asset values, Arthur's gross estate for federal estate tax purposes would be \$2,432,012.00 representing the sum of the two IRA accounts and the annuity. Assuming no administration expenses, there would be a marital deduction taken in the amount of \$580,007.00, since each of the assets making up the gross estate pass to Cindy, producing a taxable estate of -0-. Upon Cindy's death, her gross estate for federal estate tax purposes will equal \$2,432,012.00, representing the sum of the above assets received for Arthur, the investment account, her IRA, the primary residence, and the New

Can you give me
some backup?

-I-

What are the
chances of this?

IS THIS TRUE?

PLEASE

CALCULATE

HTML Trends: What's Next on the Web?

By Jim Collins

World-Wide Web development is occurring at such a rapid pace that it's difficult to predict precisely where things will go from here, but some directions seem inevitable. There will certainly be increased commercial activity and the need for secure transactions, the extension of browser capabilities into multimedia, 3-D visualization of information, and more opportunities for interactive participation.

HTML LEVELS

HTML will continue to evolve quickly. For more details about the nature of HTML, visit <http://www.ncsa.uiuc.edu/demoweb/html-primer.html> on the World-WideWeb. Netscape Communications, whose Navigator browser has the lion's share of the Web-browser market, has introduced its own extensions to HTML (sometimes called NHTML). Netscape's extensions primarily concern the look of the document, adding support for such elements as fonts, colored text, and special effects.

For more information regarding the difference between HTML 3.0 and the planned Netscape enhancements, see the papers "HTML 3.0 and Netscape 1.1N" (<http://www.corpnet.com/~aking/html3andns.html>) and "The Myth of Netscape and HTML 3.0" (<http://www.iaf.nl/%7Eabigail/HTML/Myth/myth.html>). You can read about Netscape's position at http://home.mcom.com/assist/net_sites/html_extensions.html.

HTML 3.0, still under development, will add support for tables, text-flow around figures, mathematical equations, and style sheets. You can check out the home site for HTML development, <http://www.w3.org/hypertext/>

WWW/Style, to find out more about it. As the installed base of PCs becomes more and more multimedia-capable,

support for sound and video will almost certainly be incorporated into HTML.

MULTIMEDIA AND THE WEB

If you're a frequent Web surfer, you've no doubt seen the dreaded message: "No viewer configured for file type" if

you've clicked on the odd picture or sound link. HotJava promises to do away with that problem. Based on a C++-like language called Java, HotJava uses programs called applets that are downloaded by the client software as needed. These applets can contain dynamic elements such as animation and sound. They can also be added and activated in response to the user's actions. This is

what Sun Microsystems, the developer of both Java and HotJava, calls interactive content: Instead of viewing a page, users can actively take part in creating a customized application based on their responses and preferences.

Sun has placed security mechanisms in Java to prevent the user from invoking improper or unauthorized instructions. Java also supports animation (including animated text, called "nervous text"), scrolling, and other special effects. More information, demo programs, and a prerelease Hot-

Java browser for Microsoft Windows NT (one is being developed for Microsoft Windows 95) can be found at <http://java.sun.com/>.

3-D WEB AND VIRTUAL REALITY

Several projects are under way to take the Web beyond 2-D interaction by using VRML (Virtual Reality Modeling Language) to create 3-D Web sites in which you can, in effect, walk around. Silicon Graphics, working with Template Graphics Software, has released WebSpace, a VRML-based Web browser.

WebSpace runs on multiple platforms, adapting itself to the performance capabilities of the machine. Using a tool called the Dashboard, you can move back and forth within such virtual scenes as a city, a shopping mall, Aztec ruins, or an alien planet. WebSpace also supports point-and-click navigation, letting you simply point and click on a place in the scene and go there.

The content creator can place within the scene links to other Web documents or even other 3-D sites. Objects can also

be "hot" so that they trigger events such as a sound or a move to another virtual space. More information and the latest releases can be found at <http://www.sgi.com/Products/WebFORCE/WebSpace/>.

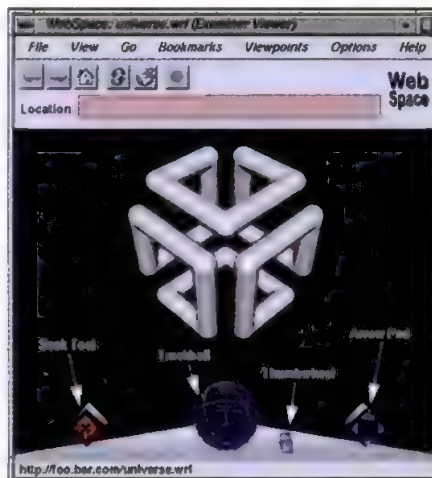
Sun suggests possible applications for this technology include virtual art galleries, reconstructions of ancient cities, and

virtual theme parks.

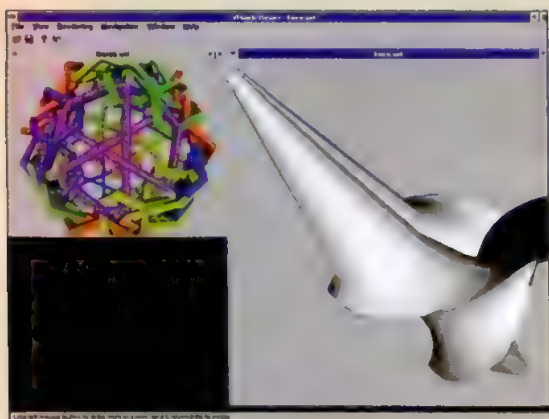
Another virtual-reality Web application under development is VRWeb (<http://www.licm.tu-graz.ac.at/>). Similar to WebSpace, VRWeb lets you



The HotJava mascot "Duke" does a little dance when you save him from being hung.



WebSpace allows movement through a 3-D space using the Dashboard.



VRWeb presents a sharp picture without jagged edges.

move around (or even fly) in 3-D—rendered virtual places. We found that scenes created with VRWeb were a lot less jaggy and appeared more realistic than those created in WebSpace, but both VRML engines are still very much under construction.

A company called InterVista Software had a 3-D browser in prerelease testing at the time of this writing called WorldView. It renders 3-D environments using Rendermorphic's Reality Lab. Learn more about it at <http://www.webmaster.com:80/vrml/>

VREAM, known for its virtual-reality product VRCreator, is also developing a VRML browser called WebView. For a preview of its work, see <http://www.Vream.com>.

Also on the virtual horizon is 3-D World Builder from Caligari Corp. (800-351-7620). The makers of the 3-D modeling/rendering/animation product TrueSpace say this new tool will use VRML to build virtual environments on the Web. No ship date was announced at press time.

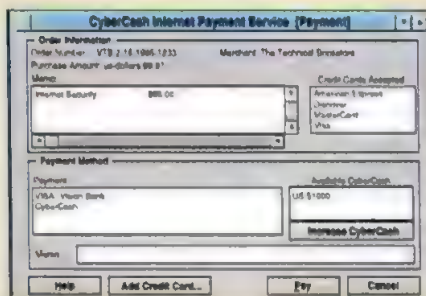
E-CASH AND SECURE TRANSACTIONS

Wouldn't it be nice if you could pay for goods and services on the Web with virtual dollars? Well, that's not quite possible, but you can pay via credit card without worrying about someone intercepting your credit-card number in transit.

CyberCash (<http://www.cybercash.com/>) and First Virtual ([\[fv.com/html/fv_main.html\]\(http://fv.com/html/fv_main.html\)\) have both developed technology for secure credit-card transactions over the Internet. Using their software, the transaction information is encrypted and sent to CyberCash for transmission to your bank. The merchant doesn't see the credit-card number, and CyberCash says it can return authorization back to the merchant within 10 seconds.](http://www</p></div><div data-bbox=)

CyberCash has reached agreements with both Wells

Fargo & Co. and Checkfree Corp. for secure Internet transactions.



CyberCash allows secure payment by credit card over the World-Wide Web.

This should make consumers much more comfortable conducting financial transactions—from purchases to bill payments—over the Web.

If that's not virtual enough for you, you can use NetCash (<http://www.teleport.com/~netcash/>). NetCash funds can be deposited by faxing NetCash a signed check. In return you receive NetCash coupons via e-mail in varying denominations. Each coupon has a serial number. To make a purchase, you send a message to the merchant that looks like this:

Dear Merchant,
Enclosed is payment for
your product.
NetCash US\$5.00
C345678D901234E
Thank you.

Transaction fees are only charged when NetCash is converted into actual money.

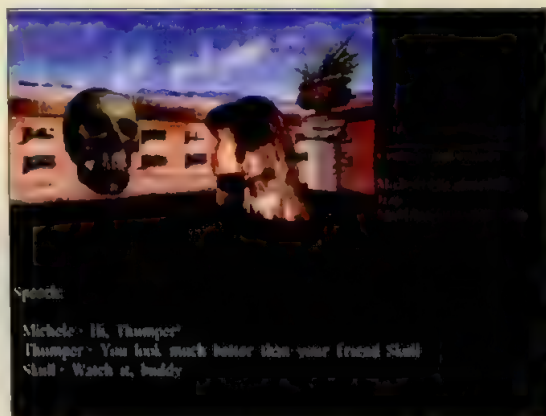
MULTIPLAYER WEB SPACES

Worlds Chat, a 3-D on-line chat environment from Worlds Inc. (<http://www.worlds.net/>), lets you take the form of an avatar and talk to other users. You can actually see the other users walking around, walk up to them, and ask them if they want to talk. You have to download special browsing software from the Worlds Inc. World-Wide Web site, but it's free.

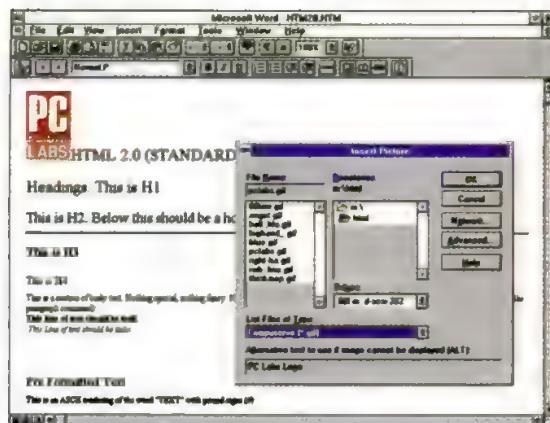
You can pick from predesigned avatars or create your own, which you can then distribute. This would be a more interesting product if it incorporated RealSound; that is, if you could actually talk and have others hear you, but you're limited to typing, much as in current versions of chat software.

A company called Ubique (<http://www.ubique.com/products/>) has introduced a similar product called Virtual Places that *does* support audio. It also supports custom images to represent the participants.

Much to the disappointment of some, the Web of the near future will become much more commercial than it is now, but it'll also offer new experiences and new ways of communicating information. This will undoubtedly create new corporations and industries, as well as some very wealthy individuals.



Worlds Chat lets you have conversations using "avatars."



Internet Assistant uses slightly modified versions of Microsoft Word's ordinary menus for most features.

SOME BUMPS

This superb conception suffers because of slow and outdated browser technology that Microsoft licensed from Internet-Works—restrained by the limits of Microsoft's HTML editing module and by a buggy .GIF filter that, for example, causes Word to crash when it opens *PC Magazine's* home page. Internet Assistant is designed to look as much as possible like ordinary Word. Although it replaces

Word's standard and formatting toolbars with special-purpose toolbars, you still use Word's normal menus and editing tools for most HTML work.

This system works well as long as you use HTML elements that convert easily into Word formatting, but it also means that some HTML formats will be easier to create than others. A HTML definition list (or glossary) can't be built from the same toolbar that creates other kinds of lists (such as bulleted lists) and will require a detour to the help system.

Complex forms are difficult to create, while Quarterdeck's WebAuthor add-on gets the job done from a menu.

KNOW THE CODE

Because Internet Assistant is limited to the HTML 2.0 specification, it converts tables to static text, not true HTML-style tables. A fill-in box lets you enter post-2.0 codes by typing them in; they display as "unknown codes" in Word, but will dis-

play correctly in Netscape. Internet Assistant imports existing HTML files, complete with active links, but it doesn't error-check the code it exports or imports.

Although the first version of Internet Assistant is only a partial success, it's still the most usable of the Word add-ons. You'll find superior performance and features from a 32-bit version designed to work with Word for Microsoft Windows 95; this version is due on Microsoft's Web page around the time you read this.

Internet Assistant for Microsoft Word for Windows. List price: On-line, free; on disk, \$5. Requires: Microsoft Word for Windows 6.0. Microsoft Corp., Redmond, WA; 800-426-9400, 206-882-8080; Web, (<http://www.microsoft.com/Msoffice/Word/ia/default.htm>).

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SUITABILITY TO TASK

Internet Assistant for Microsoft Word for Windows

	Power	Ease
Basic editing	Good	Good
Tables/forms	Good	Good
Links	Excellent	Excellent

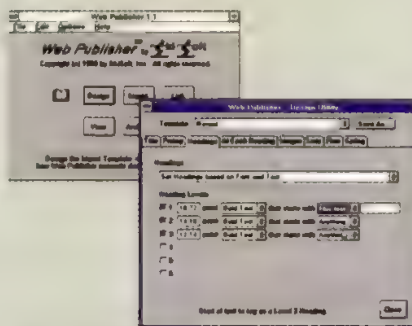
WebPublisher: The Converter That Works

By Edward Mendelson

WebPublisher converts existing word processor documents into HTML files. Other products claim to perform the same feat, but SkiSoft's \$495 package is different from the rest in one significant way: It successfully creates structured HTML files—complete with headings—when used with real-world word processor files.

You can use WebPublisher to batch-convert miscellaneous files into consistent-looking HTML pages, each with a standard headline, graphic, address, and return link to a home page. The program lets you create a set of templates, each with different conversion options and header and footer styles. Conversion occurs quickly and reliably, and a View menu then lets you view the output in an World-Wide Web browser you want.

The program doesn't attempt to



Word processing headings are converted into different levels of HTML headings.

carry out the impossible task of converting original word processor files. Instead, you have to perform the simple step of exporting each document from your word processor into a RTF (rich text format) file.

When WebPublisher converts a heading, it optionally inserts a horizontal line above the heading, a hyper-

linked index of subheadings immediately below the heading, and buttons that jump to the next and previous headings of the same level. If your original document included an index, WebPublisher creates an HTML file with a matching index with hyperlinks. Graphics in most standard formats, whether embedded or linked to the RTF file, are converted into .GIF files at the maximum color depth that you specify in WebPublisher.

Not all aspects of the program work perfectly. Though you can save as many templates as you like, the program stores them in a binary file and doesn't give you any way to remove the ones you no longer want.

WebPublisher 1.1. List price: \$495. Requires: Microsoft Windows 3.1 or later. SkiSoft Inc., Lexington, MA; 617-863-1876; fax, 617-861-0086; Web, (<http://www.skisoft.com/skisoft>).

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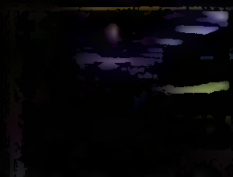
Riveting arcade action!

**COREL
CD HOME**

Includes:

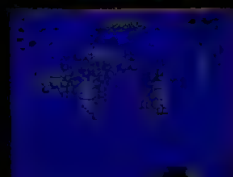
Wicked 3D rendered images
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- Intelligent enemy tanks
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Quarterdeck Office Systems

WebAuthor

Quarterdeck Office Systems' \$49.95 WebAuthor, which works as an add-on to Microsoft Word for Windows 6.0, is a more ambitious product than Microsoft's no-charge Internet Assistant and in almost every way a more convenient one. Unlike Internet Assistant, WebAuthor makes the daunting task of creating HTML forms almost effortless. A lucid series of dialog boxes lets you insert all form elements, including radio buttons, in seconds. Also unlike Internet Assistant, WebAuthor validates HTML code that it imports or exports for conformity with the HTML 2.0 specification.

Where Internet Assistant uses Word's built-in tools to create HTML styles and other features, WebAuthor replaces Word's tools with its own. To format paragraphs or characters, you use pop-up menus accessed from a toolbar or the menu at the top of your screen. You can't even access Word's built-in style dialog boxes. Although WebAuthor's keyboard layout lets you type Word's built-in shortcuts to apply bold or italic formatting to your text, this formatting is ignored when you export to HTML. The only way to generate HTML files with bold and italics is to choose them from the WebAuthor pop-up menu for character formatting.

LINKS TO THE WORLD-WIDE WEB

WebAuthor's dialog boxes used for creating links and importing images are superbly well organized and include fill-in fields for all options supported in HTML 2.0. Although WebAuthor can't validate a link, it does let you insert links to remote sites from an address book. (You build the address book by copying and pasting addresses from a browser.) A WYSIWYG screen option gives you a rough idea of what your file will look like in a browser, but you'll have to open your file in a separate browser to make sure that all links and formats have been applied correctly.

WebAuthor can import HTML files that use Netscape extensions such as tables and other proposed HTML 3.0 features but it can't create those features directly. You can enter nonstandard HTML tags by hand and format them as custom tags, and WebAuthor's validator will re-

member not to flag them when you reopen the file. The validator catches mismatched pairs of tags and can correct some of them automatically. When the validator catches an error in your file, a separate editing window opens so that you can make corrections immediately.

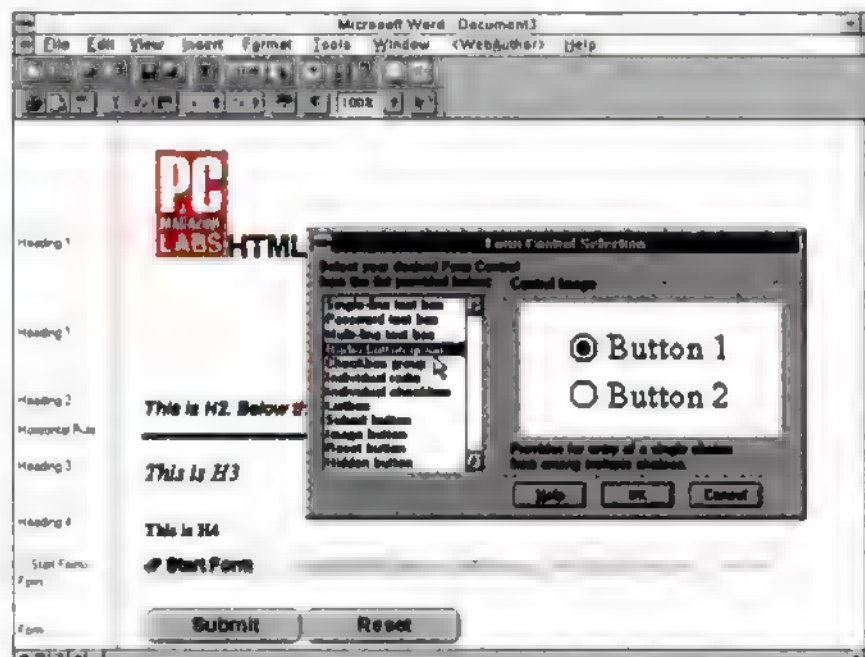
CREEPING ALONG

HTML export and import are both painfully slow, even with minuscule files. The only way to import existing Word documents is through the Clipboard. Word's default heading styles are converted into HTML styles, but all other formatting has to be rebuilt by hand.

Quarterdeck, which collaborated with Streetwise Software to write WebAuthor, promises a new version this fall that will support HTML 3.0 and the Netscape extensions, improve speed, and add the abilities to convert existing Word files and to test links. Meanwhile, WebAuthor offers more than enough conveniences and validation features to make up for its insistence that you unlearn some word processing habits in order to create HTML documents that are guaranteed to conform with the 2.0 specification.

WebAuthor. *Estimated street price: \$49.95. Requires: Microsoft Word for Windows 6.0. Quarterdeck Office Systems, Santa Monica, CA; 310-392-9851; fax, 310-314-4217; Web, (<http://www.qdeck.com/beta/WebAuthor-highlights.html>).*

Circle 444 on reader service card



WebAuthor makes complex forms simple to create through its clear, uncluttered dialog boxes.

Novell Inc.

WordPerfect Internet Publisher for Windows

Despite some rough edges and general limitations, Novell's free WordPerfect Internet Publisher for Windows will appeal to authors of World-Wide Web pages who spend most of their working life in WordPerfect for Windows. Internet Publisher is the only full-scale HTML add-on for WordPerfect and though not as feature-rich as Microsoft's and Quarterdeck's add-ons for Microsoft Word, it has the potential to be an effective product.

Like many Web tools, Internet Publisher has long been available to the public in downloadable beta versions. PC Magazine Labs tested beta B. Version 1.0, with many additional features, should be available by the time you read this.

WORDPERFECT TO YOU

When you edit in Internet Publisher you edit in a WordPerfect window with a special HTML toolbar in place of your usual toolbar. When you create a file, the program prompts you to fill in the title field that is required by all browsers. You never have to enter HTML code directly, although an option lets you do so. Instead, you format text using WordPerfect's character and paragraph styles, and these are translated into HTML code when you export the file.

You apply styles from pop-up menus or by using WordPerfect's standard style dialog boxes. Lists are created easily using a subset of WordPerfect's bullet-and-numbering feature. You simply press Tab to shift outline levels in numbered lists. Netscape-supported multinational characters are entered using WordPerfect's uniquely powerful support for large character sets. Tables and forms were entirely unsupported in beta B, although Novell hopes to include both in the final version.

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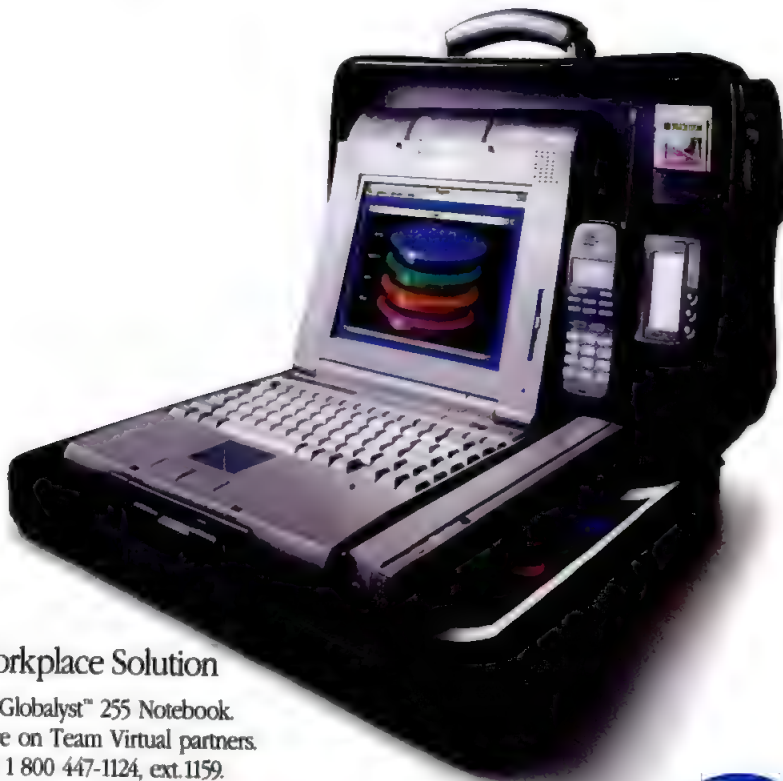


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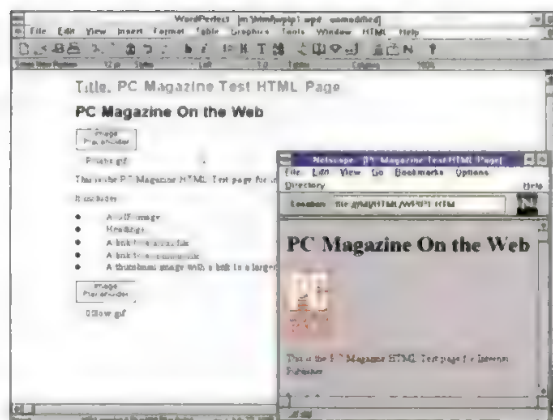
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COVER STORY
HTML-Editing Software



WordPerfect Internet Publisher for Windows can't display inline images because WordPerfect lacks a .GIF filter.

have to remember the filenames of your graphics and enter them by hand if you didn't remember to copy and paste them from a file manager or browser. With some trial and error, you can use the Import menu to create thumbnails that link to full-size images.

FREE BROWSER

The program is closely linked to Netscape and automatically installs a copy of the browser if it doesn't find Netscape on your system. When you export to HTML, Netscape opens and displays the page. When you make changes in your document, you click on the Export button, and the exported version appears automatically in Netscape. If you click on linked text or a graphic in WordPerfect, a pop-up box displays the URL of the link. To confirm that the target does exist, you click on the target in Netscape. If you want to turn off the feature that automatically opens Netscape when you export HTML,

you have to edit an .INI file by hand.

One major weakness of the program is its inability to import existing HTML files. If you want to convert a WordPerfect file, you have to copy and paste the unformatted text from another window in WordPerfect. Despite these and other limitations, Internet Publisher is an obvious choice for anyone who uses WordPerfect. Its well-designed interface lets you get a lot of work done with minimal effort. □
WordPerfect Internet Publisher for Windows. List price: On-line, free; On-disk, \$9. Requires: WordPerfect 6.1 for Windows. Novell Inc., Orem, UT; 800-861-2554 (orders), 800-321-4566 (information); fax, 800-228-9960; Web, (<http://wp.novell.com/elecpub/export.htm>.)

Circle 445 on reader service card

SUITABILITY TO TASK

WordPerfect Internet Publisher for Windows

	Power	Ease
Basic editing	Good	Good
Tables/forms	N/A	N/A
Links	Fair	Fair

N/A—Not applicable The product does not handle this task.



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CIRCLE 356 ON READER SERVICE CARD

SET UP SHOP

A Site of Your Own

You've dreamed of it; now you're ready to build it. But what are the best tools? We check out Web server software and turnkey solutions.

By Kevin Reichard



The exact moment wasn't marked with trumpet fanfares or confetti, but an important milestone in Internet history passed this summer when the World-Wide Web officially surpassed the Gopher service as the most popular offering on the Internet—a remarkable rise to a remarkable new communications medium.

Today, the Web is one of the world's most important publishing media—and quite possibly the largest, at least in terms of audience. Consequently, tens of thousands of businesspeople are eager, even desperate, to “create a presence” on the Web.

It's a cyclical feeding frenzy: As more home pages appear, more users have a reason to sign up for Internet access, and the growing number of users attracts more content providers. The Web is past the novelty stage: These days, you can find oceans of useful information, ranging from government databases to investment services to subculture “magazines” to customer support for a panoply of products.

IN THIS REVIEW

Windows NT-based servers reviewed:	
Communications Builder.....	233
Commerce Builder.....	233
HTTP Server for Windows NT 0.96.....	239
Netscape Communications Server 1.1.....	242
Netscape Commerce Server 1.1.....	242
Purveyor 1.0.....	243
WebSite 1.0.....	249
Turnkey solutions reviewed:	
Internet AlphaServer 1000.....	266
Netra Internet Server.....	269
WebForce INDY.....	270
Web Server 10.....	256
Editors' Choice.....	232, 256
Specialty Web Publishing Tools.....	236
Too New to Review.....	238
Why We Couldn't Test Server Performance.....	242
Summary of Features.....	249, 265
Win 3.1x Servers: A Web Site on Every Desk.....	260
The Apple Internet Server Solution.....	268

ON MY EARS AND WHISKERS!

Take, for example, the home page run by White Rabbit Toys (<http://www.toystore.com>), a toy store in Ann Arbor, Michigan. Once connected, you see an overview of the store and its offerings, and you can follow links to a more complete catalog of toys, an order form, and other resources. On the order form itself, you merely click radio buttons to make selections and enter ordering information. After receiving the order, the server generates a confirming e-mail message. This is the shape of electronic commerce to come.

The example shows both the strengths and weaknesses of Web-based commerce today. On one hand, it's great to be able to browse listings of fuzzy animals and order a Kermit the Frog doll

without leaving your desk. On the other hand, an order (that is, a credit card transaction) placed here isn't necessarily secure; any of the computers between your workstation and White Rabbit Toys server could "sniff" your credit card number. Because of this unpleasant possibility, White Rabbit also provides an 800 number for ordering.

JUMPING ON THE BANDWAGON

Though it's difficult to pin down exact numbers, it's generally accepted that from 20 to 30 million computer users currently have access to the World-Wide Web. With numbers like these, the Web looks pretty compelling to most commercial enterprises. So how difficult and expensive is it to establish a Web site? The process may be a lot easier than you think.

Probably the least stressful route to the Web is to contract with a service provider who will put your home pages on its Web server and manage them. Some providers will design your pages for you—even your content. This approach requires little or no capital investment, but it's not cheap.

If you do the job yourself—the approach we focus on here—you'll need a direct connection to the Internet and you'll need to purchase and set up your own Web-server hardware and software. Here you face a fundamental choice: You can buy the hardware and software separately, handling the installation and configuration yourself (with or without the help of vendors), or you can buy a turnkey hardware/software solution that contains everything you need to get on-line.

To help you explore this decision, we've gathered together two groups of products: One consists of all the currently shipping Windows NT-based server software packages; the other contains a quartet of turnkey server systems (three Unix-based, one Intel-based), all of which include the Netscape Communications Server package (the closest we have to a standard today). In addition, we include sidebars on server software that runs under Windows 3.1, specialized Web publishing tools (that make database and other nonstandard content accessible via

HIGHLIGHTS

Web Servers

Rolling your own Web site is becoming a more realistic alternative every day. Server software is becoming easier to configure and manage, and turnkey hardware/software bundles make sure you get everything you need to launch your site and keep it going. Webmasters can now concentrate on content instead of worrying about the minutiae of Web site configuration and maintenance.

TURNKEY WEB-SERVER solutions take most of the guesswork out of gearing up to launch a Web site. Consequently, more vendors—and VARs—are getting into this game. Now that there are hardware/software systems available to meet just about

any need, more and more Web sites should crop up.

THERE'S A RUSH to Windows NT-based Internet software going on right now. Developers of all kinds of Unix tools—including Web and other servers—are bringing out NT versions. The demand for NT servers is rising so rapidly that some newer companies are bypassing Unix and going straight to NT.

INTERACTIVE APPLICATIONS (programs running on Web servers and viewable on Web browsers) are the latest rage in Web publishing. Among other things, these common gateway interface (CGI) apps can manage database systems, moving

information *in* from and *out* to users.

PROGRAMMING and scripting languages for creating CGI applications are coming into their own, especially on the NT platform. Perl, Visual Basic, C++, and Tool Command Language (TCL) are all being used today—in some cases to build highly sophisticated programs.

SECURITY is the big stumbling block for many of today's newer Web server products. Preventing unauthorized access to your organization's computer networks is clearly a big issue for most companies, and few of the products we looked at address it adequately out of the box.

the Web), a Macintosh Power PC-based turnkey solution from Apple Computer Co., and a look at server software products released after our testing deadline.

THE WORKINGS OF THE WEB

In arriving at an educated decision on purchasing equipment, it helps to have a clear idea of what's actually going on behind the scenes. On one level, the Internet is immensely complex, particularly if you look at how all the computers are connected. On the computer-to-computer level, however, the Web is built around very simple transactions. Basically, a Web browser uses a TCP/IP connection to pass a request to a Web server running an HTTP (Hypertext Transfer Protocol) "service" (under Windows NT) or "daemon" (under Unix). The HTTP service then responds to the request, typically by sending a Web page (formatted in the Hypertext Markup Language, or HTML) to the browser. The browser then displays the Web page using local resources (fonts and colors).

Today's Web servers can expand on this basic transaction in a number of ways, however. All Unix servers and most Windows NT servers now support the Common Gateway Interface (CGI), which allows a program or script to be run on the server as part of the original HTTP request for a Web page. The content of the outgoing Web page is then altered, based on the output from the program or script. This is how you can search the Lycos database (<http://www.lycos.com>), for example, and have the results formatted and returned to your browser as an HTML page.

The importance of Web-server software, with its growing intelligence and adaptability, can't be overstated. It's clearly the primary line of evolution in Internet technology today. To determine which operating system and server software package is best for your organization, read on.

Our Contributors: SEAN GONZÁLEZ is a systems support manager at Information Access Co. TONY POMPILI is a contributing editor of *PC Magazine*. LEONARD PRESSBERG is a computer consultant and freelance writer. KEVIN REICHARD has written books for MIS:Press on various operating-system topics. O. RYAN TABIBIAN is a network engineer and frequent contributor to *PC Magazine*. Senior associate editor TED STEVENSON was in charge of the story, assisted by associate project leader DAN SMITH and LARRY SELTZER, a technical director at PC Labs.

Windows NT-Based Servers: What's the Rush?

THE INTERNET WAS BY and large built on the back of the Unix operating system, and Unix has reigned supreme as the OS for Internet servers ever since. But lately, there's been a rush to Windows NT as an Internet server platform, and it's gaining momentum as developers of all kinds of Unix-based Internet applications—Web servers included—are hastily bringing Windows NT versions to market. Moreover, a number of vendors new to the market are going straight to Windows NT.

Why the rush? Partly because Windows NT Web servers have improved so much, both in terms of configurability and usability, since our last look at the field ("Building a Web Presence," May 16, 1995). Some improvements have matched Unix-server features, such as the ability to run Common Gateway Interface (CGI) scripts. NT itself has improved, too (while Unix essentially has not) in its basic robustness and stability as a true multithreading, multitasking OS—while Microsoft has added some TCP/IP- and Internet-specific changes that enhance Web-server performance. And some of Windows NT's natural advantages over Unix—like user familiarity with the interface and friendlier configuration tools—are beginning to emerge.

SIMPLE UNDER THE SKIN

At their core, all Web servers do basically the same thing, and in all honesty, they

aren't especially elaborate applications. A "process" (in Unix) or "service" (in Windows NT) answers TCP/IP requests from a remote Web browser, first processing and then sending out a Web page. There are variations on this theme—Windows NT 3.51 streamlines this transaction somewhat with an API call, TransmitFile, that Web servers can employ—but by and large a Web server is a transaction processor.

By Kevin Reichard

Of course, such transactional processing is where Unix servers shine most, and on a large scale it's hard for a Windows NT system to compete. You can use the same techniques to improve the performance of either a Windows NT or a Unix server—giving it lots of RAM and ensuring that popular services remain in a RAM cache—but a large-scale Unix server will always have a leg up on a Windows NT server.

Therefore, conceding a basic performance advantage to Unix, configuration and maintenance options emerge as more important criteria when looking at Windows NT-based Web servers. Chances are that today's Webmasters aren't fascinated by the ins and outs of the HyperText Transport Protocol, HTTP daemons, or Windows NT services. Instead, they're focusing more on the end product: They're interested in tools for creating and managing Web pages (especially interactive ones) with fancy image maps and the like.

WHAT WE LOOKED AT—AND HOW Since all the Web servers perform basically the same tasks, and many are based on the same core technology, we decided to look at these Windows NT Web servers from the perspective of the Webmaster—that is, how easy they are to install, con-

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Hard Drive	630MB	1GB	1GB
Cache Internal	8KB	16KB	16KB
Cache External	256KB (optional)	256KB	256KB
Local Bus Graphics	PCI	PCI	PCI
Video Memory/Max.	1MB/2MB	1MB/2MB	1MB/2MB
Compaq 150 Color Monitor	Yes	Yes	Yes
Diskette Drive	3.5" 1.44MB	3.5" 1.44MB	3.5" 1.44MB
Expansion Slots (Total)	3	4	5
Drive Bays (Total)	3	4	5
Ports: Serial/Parallel	1/1 (ECP)	1/1 (ECP)	1/1 (ECP)
Security Features	Yes	Yes	Yes
101-Key Keyboard, Mouse	Yes	Yes	Yes
Software	Windows 95 or MS-Windows® 3.1	Windows 95 or MS-Windows 3.1	Windows 95 or MS-Windows 3.1
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Netscape Commerce Server 1.1

The Windows NT-based Web server is in the midst of an accelerated yet jerky evolution: The creature is now walking upright, but its knuckles are still dragging on the ground.

Our Editors' Choice in this rapidly changing software category is Netscape Commerce Server 1.1, but the recommendation is a qualified one. Commerce Server met our testing criteria in all areas: It is relatively easy to configure, which makes it appropriate for the beginning Webmaster—and, with advanced features like SSL (Secure Sockets Layer) for security, multithreaded processing, and an API designed to cut down on transaction overhead, it is a suitable choice for heavily used Web sites. However, its list price of \$2,995 is on the high side, even when compared with other Unix-based offerings intended for heavy usage.

For those whose needs are more modest, we'd recommend a look at O'Reilly & Associates' WebSite or either of The Internet Factory's two servers—Commerce Builder or Communications Builder. These products are less expensive than Netscape Commerce Server; they range in price from \$495 to \$995, and each one shines in its own way.

WebSite is an exemplary CGI development tool, with crystal-clear documentation and enough sample CGI

scripts to get you quickly up to speed on scripting your own applications. With a nifty organizational viewer and an image-map editor, it also shines at Web page management: All it needs is an HTML editor to be a complete Web page creation and management solution. On the other hand, WebSite lacks multithreading, and its reliance on CGIs (as opposed to reliance on an API with less overhead, such as Netscape Commerce Server's) brings performance issues to the fore, making it best suited for small to medium-size Web sites.

Also intriguing are The Internet Factory's offerings. Commerce Builder matches Netscape Commerce Server in the most important areas, especially security via its use of SSL. Both Commerce Builder and Communications Builder offer chat databases, a rarity in the Web-server world. Like WebSite, however, both rely on CGIs and lack multithreading, resulting in the same performance deficit. Still, these are products to watch in future revisions, and their status as the only servers to run under Windows 95 might influence some buyers.

program files, as was the case with Netscape Communications Server. Others (like the EMWAC HTTP server) install to a default directory and store files in a single default data directory.

Desirable configuration options include a hierarchical display of the data files—preferably tracing links between files—through either a proprietary display or a hook to the Windows NT File Manager. Almost all the reviewed products provided such a display, but not all followed links. Maintenance features should include a comprehensive log facil-

ity (that is, something more than the baseline Common Logfile Format found in most Web servers) as well as the ability to analyze log entries. All the reviewed products log hits, but few provide analytical tools, either as part of the core package or as add-ons. (WebSite is an example of a product that provides several internal analytical tools and makes other tools available for download to registered users.) Finally, security features should include file and directory permissions as well as the ability to set up passwords for Webmasters and users.

SERVER AS DEVELOPMENT PLATFORM

Perhaps the biggest improvement in the Web server world since our last look at the market has been the emergence on Windows NT of CGI applications. Web servers that conform to the CGI 1.2 specification can essentially run programs or scripts on the network and display the output on the browser. For example, an interactive user form (written in the Netscape API, Visual Basic, Visual C++, TCL or just about any programming or scripting language that runs on Windows NT) can react to your input and select follow-up Web pages automatically.

The implications of CGI are vast; instead of a Web server simply shuttling HTML pages, it can react to users' needs and specifications, gathering input from forms and returning appropriate information. The Web is still immature when it comes to advanced database management, but tools like CGI 1.2 and Visual Basic help the process immeasurably.

O'Reilly & Associates' WebSite focuses on such development—especially in the documentation—with a wealth of examples. Netscape takes a different, but equally compelling, route by including a proprietary development API with its Web server, with all the advantages and pitfalls a proprietary API brings.

The other side of this bright coin is that heavy reliance on CGIs inevitably drags down server performance. Serving a Web page or other file to a browser is a simple transaction, requiring minimal CPU participation and disk access. Running a CGI program means that you're allocating server CPU time and memory to the task, with the same overhead associated with any database transaction. If your Web site



figure, and manage. Thus, we focused our testing on four areas: installation and setup, customization, maintenance, and security. (For most servers, performance is not critical, so we made no formal attempt to measure processing speed. See "Benchmark Tests" for details.)

We looked for servers that provided a high level of flexibility and guidance throughout the installation process. Some servers provide a multitude of installation options—even to the point of allowing multiple servers to run on the same machine, each taking advantage of shared

is already slowed down by heavy traffic, running CGI scripts will only contribute further to the log jam. (Netscape claims that its proprietary API cuts down on this processing overhead.)

SECURE COMPUTING

There's one key area where Windows NT Web servers unquestionably lag behind their Unix cousins: data security. Features like the Secure Sockets Layer (SSL) and implementations of the Secure-HTTP protocol are just beginning to appear in the Windows NT world. Today, only the Netscape Commerce Server supports SSL, while Secure-HTTP is promised for later versions of a number of the reviewed products.

Aside from Netscape Commerce and Commerce Builder, the products we reviewed don't adequately address security. Some, such as WebSite, allow you to assign elaborate permissions to individual files and directories, while also providing separate passwords for Webmasters and for the Windows NT administrator log-on. Others, such as Purveyor, allow for files and directories to be protected but don't add additional password protections for Webmasters. Still others, like the EMWAC

HTTP server, offer minimal protections. If you're looking at a single machine on the Internet with no links to other machines at your workplace, security might not be a huge issue. Otherwise, you'll want to look at one of the two Commerce servers, with their Secure Sockets Layers.

Finally, we were disappointed at how few new Windows NT-based Web servers could be set up as a proxy server. (A proxy server essentially acts as a low-rent fire wall, allowing Webmasters to specify

which IP addresses internal users can and can't connect to as well as limiting IP address and password exposure over the wire.) Only three of the seven products we review (Purveyor and the two Internet Factory servers) support usage as proxy servers. Since for many companies a

proxy server will be security enough, it's a shame this usage isn't more common.

Our conclusions? The Windows NT Web server field is rapidly evolving, and some of the products we reviewed are worthy competitors to Unix-based solutions. Still, with the exception of the two Commerce servers, there are serious problems with all the products reviewed when it comes to security issues, which may well affect your buying decisions.

*One area in which
Windows NT servers
unquestionably lag
behind their
Unix-based counter-
parts is data security.*

The Internet Factory Inc.

Commerce Builder Communications Builder

BY O. RYAN TABIBIAN

Good things often come in small packages—even Web servers. The first Web-server products to hit the market (a couple of years ago) were only a few megabytes, in most cases were free, and yet had plenty of features. But today, products like Netscape, for example, though providing a lot of functionality, are becoming bloated and cost thousands of dollars. Fortunately, companies such as The Internet Factory are reversing this trend, proving that it's possible to offer feature richness while still maintaining a small footprint and selling at a reasonable price.

The Internet Factory's Communications Builder (\$495) has many of the attributes we found in the Netscape Communications Server, including simple management and scalable design, and offers a host of popular features such as user databases, image maps, and support for CGI scripts. The Internet Factory's Commerce Builder (\$995) joins its Netscape counterpart in incorporating full Secure-Sockets-Layer (SSL) security on Windows NT—and is the *first* product to offer SSL security on a Windows 95-based server, since both Internet Factory products run on Windows 95 as well as NT.

In addition to the HTTP server component, The Internet Factory's products

WINDOWS NT SERVERS

Suitability to Task

For many Webmasters, **setup** is by far the most important task to take into consideration. We look at the process of getting a Web server up and running, and the integration of the product with the operating system, which is crucial for smooth Web publishing.

In the **customization** task, we look at such features as protocol support, extensions that let you add features through other products, search engines, and authoring tools like HTML editors for presenting your content.

In our previous roundup of Web servers, the category was new, and only a very few products were available for evaluation. In this issue, we evaluate seven new Web Servers, from five vendors, that range from basic to quite full-featured Web publishing and distribution solutions.

SUITABILITY TO TASK		
	Power	Ease
Setup	Fair	Fair
Administration	Poor	Poor
Customization	Good	Good
Security	Good	Good

The **administration** task looks at specific tools provided to manage the server—tools to monitor server performance, log statistics, and provide information about server-usage profiles. We look for products that support or include scripting languages as well as the ability to handle file and directory maintenance easily and graphically.

Finally, we look at **security** tasks such as administrative and user security on a database, authentication, and the ability to use the server outside the content of a hypertext document server.



TI Travelmate 5000, P75, 10.4" TFT, 8 MB RAM, 772 MB HDD



Toshiba T4900CT, P75, 10.4" TFT, 8 MB RAM, 772 MB HDD



Samsung SENS 800, P75, 10.4" TFT, 8 MB RAM, 772 MB HDD

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N700, DX4/75, 10.4" color Active Matrix TFT, 520MB HDD, 8 MB RAM	\$2,749
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- Spare NiMH battery included (SENS 800 only)
- 3 year warranty (SENS 800 only)
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S200, DX4/75, 7.8" color Active Matrix TFT, 520MB HDD, 8 MB RAM	\$2,749

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The World-Wide Web is the world's trendiest publishing medium—as well as the biggest. But as we move into the future, large corporate and institutional collections of information, stored in computer databases and document archives, may well supplant slick HTML pages with embedded graphics and sound clips as the bread and butter of Web publishing.

Realizing the potential of publishing this kind of data, a number of software developers are building specialized products designed to move big chunks of information to HTML format and get it out across the Web efficiently. We look at four of them.

FOLIO INFOBASE WEB SERVER

The Folio Infobase Web Server for Windows NT (list price, \$6,995; Folio Corp.; 800-228-1132, 801-229-6720) is an efficient tool for distributing contents of Folio Views Infobases over the World-Wide Web, providing on-the-fly translation of Infobases into HTML and serving up the content one HTML page at a time. If Infobases are the primary method of distributing information in your organization, or if you have a large amount of regularly updated information to publish over the Web, the Folio Infobase Web Server should prove invaluable.

Installing the product is fairly simple. After the installation program copies the files, it offers to start the server configuration program automatically. Unfortunately, all documentation for the server is electronic (contained in an Infobase) and is not accessible until the installation is complete. A short printed installation guide would help tie users over until they could see the full manual on-line.

The Infobase Web Server is actually two products in one: an HTTP server and the Infobase-to-HTML converter. The HTTP server—a commercially licensed version of the freeware HTTP server available from the European

Microsoft Windows NT Academic Centre (reviewed in this article)—runs as an NT service, so it does not require users to be logged in. The server provides access through HTTP, Version 1.0; it supports HTML forms and clickable image maps and can log transactions by IP number. It also supports powerful access control of paths or individual files based on IP addresses or user names, although configuring the access control is an awkward process at best.

The core of the product is the Infobase-to-HTML converter. It supports almost any object present in an Infobase except for links to external programs. The Web Server is highly configurable, and options can be set

Version 1.1 (scheduled for release in October 1995), Ameritech(800-556-6874, 708-866-1726) enhances Version 1.0 of Net Publisher's powerful document manager, addressing some shortcomings we voiced in our review.

Both versions of NetPublisher (list price: library version, \$16,400; commercial version with HTTP and Gopher protocols only, \$800) organize Web content into hierarchically structured publications that you manage with a drag-and-drop interface. The graphical editor can build clickable images; you don't have to worry about configuration files, image map coordinates, or similar intricacies.

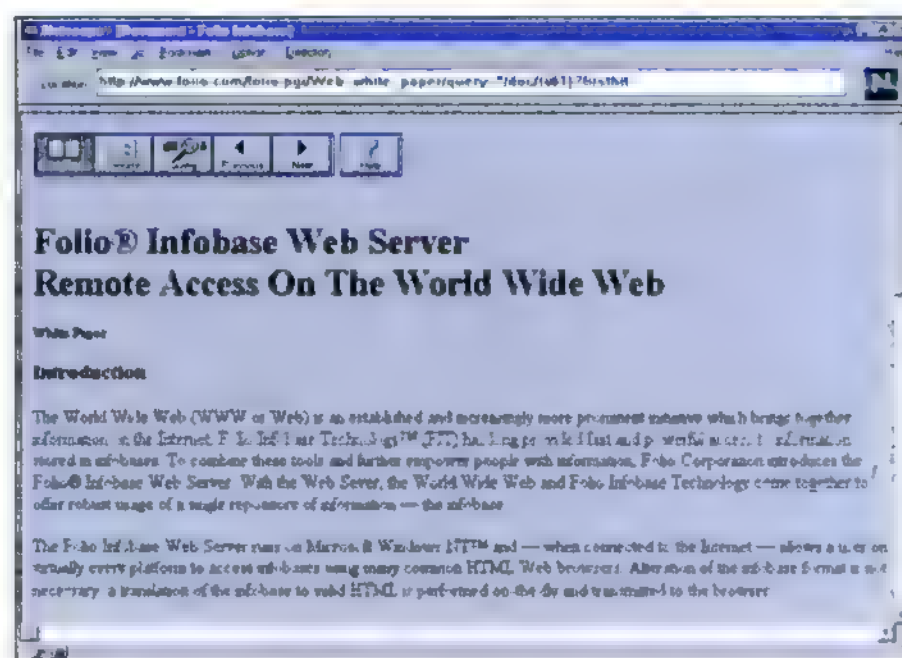
A handy new feature lets you create aliases to refer to pages, which in turn

lets NetPublisher implement HTML item types. This way, you can refer to other pages in your publication using standard URLs, a task that was nonintuitive in the prior version. Another improvement is NetPublisher's ability to force copyright protection notices before displaying content—a change many publishers asked for.

Further, the product's editor will become a true 32-bit application that will allow 20,000 items per

publication. The NetPublisher server is still limited to running only one publication at a time, but in a release expected after Version 1.1 you will be able to serve multiple publications concurrently from one server. Performance speed will be addressed as well in the future: NetPublisher will pre-generate HTML documents rather than generate them on the fly, as Version 1.0 did; this should make it much faster when handling large volumes of content.

—Sean González



The Folio Infobase Web Server translates the searchable contents of Folio Views Infobases into HTML documents, making it possible to "publish" them on the Web.

globally or for individual infobases. Note that Folio's license agreement calls for a 5 percent royalty on any charges for commercial distribution information provided by the server. —Leonard Presberg

NETPUBLISHER

In our issue of May 16, 1995, we reviewed (and awarded an Editors' Choice to) Ameritech Library Services' NetPublisher, a Windows NT product built to manage Gopher-like library content on the Web, using HTML. In

PUBLISHING FROM NOTES

Companies trying to distinguish themselves on the Internet are turning to their caches of database information to make their Web pages more valuable. One database application getting a lot of attention in this Internet feeding frenzy is Lotus Notes. Using a full-text, rich-text database document format, Notes databases are ready for Internet publishing. And Lotus Corp. (800-826-7086, 617-577-8500) has developed a product, the InterNotes Web Publisher (estimated street price, \$6,589), that automatically converts Notes databases to HTML pages ready to be distributed by a Web server.

InterNotes creates HTML 2.0-formatted pages supported by most of the popular browsers, including Netscape Navigator and Mosaic. Web Publisher converts everything—from documents, views, Notes hypertext document links, graphics, and attachments—to HTML pages. The idea is that you can put your Notes databases on-line almost effortlessly, without much human intervention.

The InterNotes Web Publisher is itself a Notes database application that runs completely in the standard Notes environment. A configuration database lets you schedule updates for each individual Notes database. The actual process of running the conversions is done on the Notes server itself. InterNotes Web Publisher currently runs only on a Microsoft NT server but will soon have OS/2 support.

A less expensive method of converting Notes databases to HTML pages comes from Walter Shelby Group (310-718-7840): Tile, Version 1.0 (\$2,995) is a standalone Windows product that should appeal to the more experienced Webmaster. While not as automated as Web Publisher, Tile supports Netscape's HTML 3+ and thus offers a more extensive range of formatting options. To implement its features, however, you must know HTML quite well.

—Tony Pompili

include a ChatRoom discussion database (similar to Internet Relay Chat [IRC] or America Online Chat). By the time you read this, these products will include a secure version of ChatRoom that will use SSL to hold secure conversations over the Internet. The two Builder products can also function as proxy servers (gateways that pass information between an organization's internal network and the Internet, thus isolating the internal network from outside infiltration), the only servers in this review besides Purveyor to do so.

INSTALLATION

Installing these products is simple and straightforward. Communications Builder comes on a single floppy disk, Commerce Builder on two. Both products can be installed either as Windows NT services (the method of choice if you'll be running under Windows NT, since Windows NT has excellent remote tools for managing Windows NT services from anywhere on the network) or as executable Windows applications (which lets you run them under Windows 95).

During installation, we ran into a few minor problems, such as creating the correct URL and setting up security, that could have been easily resolved if the product had included written documentation (which will be available by the time you read this). As it was, we called technical support, which cleared up our problems in a matter of minutes.

You manage both the Communications and Commerce Builder through a control-panel applet, which lets you do such things as create services, add or

FACT FILE

Commerce Builder, Communications Builder

List price: Communications Builder, \$495, Commerce Builder, \$995. **Requires:** Windows NT 3.5 or higher, 3MB hard disk space. **In Short:** Both Internet Factory products are excellent low-cost solutions, combining a full set of features and functions in a small footprint. Anyone looking for a Windows NT-based Web server cannot go wrong with either of these products.

The Internet Factory Inc., 6654 Koli Center Parkway, #165, Pleasanton, CA 94566, 510-426-7763, fax, 510-426-9538

475 on reader service card

SUITABILITY TO TASK

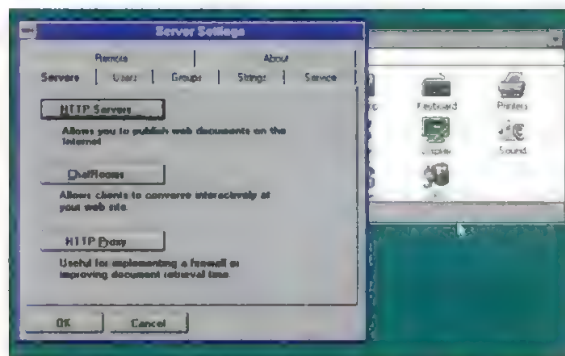
	Power	Ease
Setup	Good	Good
Administration	Good	Good
Customization	Fair	Good
Security	Good/Fair	Excellent
Commerce Builder	Communications Builder	

delete users, stop or start the server, and set MIME Mappings and Virtual Paths. Even more interestingly, you can manage any other Internet Factory server, anywhere on the network, from this applet, thanks to the product's tight integration with Windows NT's remote management facilities.

Though we found the Internet Factory products' overall management superior to Netscape's solution, it is somewhat less flexible. Veteran Windows users will especially appreciate the tabular format through which you can navigate to all management and configuration aspects of the product—all from the familiar Control Panel. This approach limits you, however, to managing the product only from another Windows NT server. Netscape, on the other hand, uses the Netscape Navigator as its server management vehicle, so you can virtually use any machine anywhere on the Internet to manage Netscape's Communications Server and Commerce Server.

IS IT SECURE?

The Internet Factory's Commerce Builder implements security in much the same way as Netscape's Commerce Server. Commerce



Managing The Internet Factory's Communications Builder and Commerce Builder servers is a snap with this intuitive control-panel utility.

Builder uses a public-key/private-key security scheme, which calls for a digital certificate (an extra-cost item) from a certification authority, such as VeriSign, a subsidiary of RSA Data Security, that validates the legitimacy of your business.

Although The Internet Factory's products match the functionality of their Netscape counterparts in many respects, they lack Netscape's innovative thread management system (see the review of Netscape Communications Server and Commerce Server), so they can't be ex-

pected to perform as well under heavy loads.

Another limitation of the Internet Factory products, relative to Netscape's offerings, has to do with access control. Whereas with Netscape's products you can set access-control lists based on a variety of criteria, with The Internet Factory's products, you can base such control only on user-name passwords and IP addresses (either a single address or a range of addresses). Moreover, The Internet Factory's products have no built-

in facility for filtering based on domain names, which could pose a problem for those looking to restrict access to their servers from certain domains on the Internet.

Within the framework of their limitations, The Internet Factory's Communications Builder and Commerce Builder are both excellent all-around Windows NT-based servers, especially at the price. The fact that both will run on Windows 95 and, more important, can function as proxy servers should only broaden their appeal.

Too New to Review

By Kevin Reichard

During the course of almost every software roundup, new products are released late in the game that certainly would have been included had they shipped in time. Occasionally, one or more products will fall outside the scope of the story but are nonetheless worthy of mention.

For this particular story, quite a few products showed up late: new Microsoft Windows NT, Microsoft Windows 95, and Microsoft Windows

3.1 servers, upgrades to products that have already been reviewed in *PC Magazine*, as well as new and noteworthy Unix and OS/2 entrants to the marketplace.

Some interesting trends pop out in the rapidly growing area of World-Wide Web servers. First, most of these new products are tied in some way or other to SQL or other database management software.

Further, many new Windows NT packages incorporate more advanced

security—mostly in the form of Secure-HTTP or the Secure Sockets Layer—than do the packages reviewed in this issue.

Finally, many of these packages promote proprietary APIs, usually in conjunction with CGI support. Netscape's Communications Server 1.1 and Netscape's Commerce Server 1.1 reviewed here pioneered the APIs, but the idea has caught on, most notably with Process Software Corp.'s server, Purveyor 1.0.

Vendor	Product	Operating systems	Price	Release date	Security	Notes	Web location; phone number
CompuServe Internet Division (formerly Spry Inc.)	Internet Office Web Server	Windows NT, Sun Solaris, SunOS, HP-UX, AIX, BSDI	\$599	9/95	S-HTTP, SSL	Includes Architext database and search engine, HTML authoring software, and SQL database support	http://www.compuserve.com ; 800-777-9638, 206-447-0300
Frontier Technologies Corp.	SuperWeb 1.0	Windows 3.x, Windows NT, Windows 95	About \$1,250	9/95	S-HTTP, SSL	Targets enterprise solutions in small to medium-size businesses	http://www.frontiertech.com ; 800-929-3054, 414-241-4555
IBM Corp.	Internet Connection Server 1.0	OS/2 Warp, AIX	OS/2 version, \$799; AIX version, \$1,449	8/95	S-HTTP, SSL	Adds another layer of security, IKP, for secure transactions	http://www.ibm.com ; 800-428-3333
NaviSoft Inc.	NaviServer 1.0	Windows NT, Sun Solaris, SunOS, SGI Irix, HP-UX, Digital Unix ¹	Windows NT version, \$4,995; Unix version, \$1,495	8/95	User, domain, and IP-access control	Includes direct link to Illustra database and is multithreaded	http://www.navisoft.com ; 800-879-6882, 703-918-2329
Open Market Inc.	Secure WebServer 1.1, WebServer 1.0	Sun Solaris, SunOS, Digital Unix ¹ , BSD/386	Secure WebServer, \$4,995; WebServer, \$1,495	Secure WebServer: 8/95; WebServer: 6/95	Secure WebServer: S-HTTP, SSL; WebServer: none	Optimized for use with Netscape Navigator; can be tied to Open Market's Integrated Commerce Service	http://www.openmarket.com ; 800-801-8504, 617-621-9500
Process Software Corp.	Purveyor 1.1	Windows NT	\$495	9/95	User, domain, and IP-access control	Includes WAIS, enhanced log analysis, virtual servers, and SOP/ODBC support	http://www.process.com ; 800-772-7770, 508-879-6994
Process Software Corp.	Purveyor Desktop WebServer	Windows 95	\$295	8/95	User, domain, and IP-access control	Purveyor 1.0 for Windows NT also runs on Windows 95	http://www.process.com ; 800-772-7770, 508-879-6994
Spyglass Inc.	Spyglass Server	Windows NT, Sun Solaris, SunOS, Digital Unix ¹ , HP-UX	N/A	8/95	Basic security authentication	Licenses to 36 vendors, including IBM, Microsoft, and Oracle	http://www.spyglass.com ; 708-505-1010

¹ Formerly DEC OSF/1.

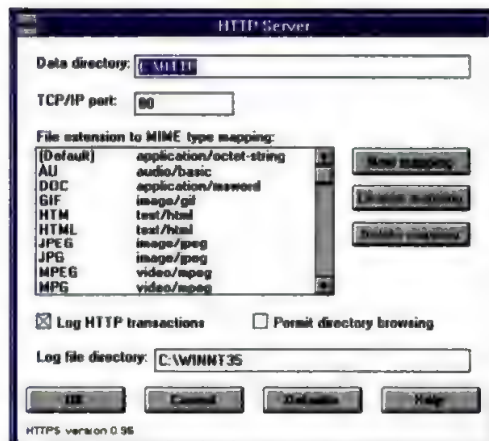
N/A—Not applicable. The technology is licensed to other vendors and not sold directly by Spyglass.

EMWAC HTTP Server for Windows NT

BY KEVIN REICHARD

You can't get any more basic than the freeware HTTP server from EMWAC (European Microsoft Windows NT Academic Centre at Edinburgh University Computing Services). It's set up to handle basic Web HTTP transactions with a minimum of fuss. And though it may not be the best choice for a large-scale professional site, as a learning tool or an in-house server, the EMWAC HTTP Server certainly merits a look.

After you grab EMWAC HTTP off the Internet (the latest version is available at the EMWAC home page <http://emwac.ed.ac.uk>; the filename is hsi386.zip), you'll need to unzip and install it. (An older version can be found in the Microsoft Windows NT Resource Kit from Microsoft Press.) The server sets up as a Windows NT service under the Control Panel. From there, you perform the basic system configurations: MIME file associations, port, system log directories, directory browsing, and data directories. A few other functions, such as the actual installation, occur at a DOS command line. Although installation is not especially tricky, you will need to read through the documentation thoroughly and move some files around before you actually launch the EMWAC HTTP Server.



The limited functionality of the EMWAC server is shown here; your only options are MIME mappings and data directories.

BARE BONES

If you think the description of the basic system configurations sounds a tad skimpy, you're correct. In a way, it's more useful to define the EMWAC server by what it doesn't do than by what it does: The EMWAC server has virtually no security mechanisms—no user accounts, no passwords, no protected files or directories, no Secure Sockets Layer or Secure HTTP—only the ability to limit directory browsing.

HTML files aren't graphically represented; you place them in the data directory and use other tools to manage them. And no automatic redirection, editing of error messages, or additional services like a search engine are offered.

In defense of EMWAC, however, the HTTP server is clearly meant to be one part of an Internet suite, which includes a Gopher server, a finger server, and a WAIS server. All these tools are available from <http://emwac.ed.ac.uk>. The documentation details how to add a WAIS server to an EMWAC HTTP installation.

SOME SILVER LININGS

Happily, the EMWAC server offers some unexpected surprises. It supports CGI 1.1, which means you can run Windows NT .EXE programs on the server and display the output on the Web browser. (CGI 1.2 support, however, would have been a more pleasant surprise.) The EMWAC distribution includes several example scripts, and the documentation adequately explains how to implement CGI scripts. (The documentation itself is in the form of Word for Windows .DOC and Windows Write .WRI files that you'll need to print yourself. Still, for free-ware, the documentation is remarkably complete.) Map files are fully supported using the ISMAP function. And as for the reliability issue, even though the version number is 0.96, the EMWAC HTTP server has a reputation for being a reliable, low-maintenance tool.

The HTTP server's tracking tools are adequate. The server log (which unfortunately is inaccessible when the server is running) conforms to the Common Logfile Format, but

FACT FILE

HTTP Server for Windows NT 0.96

List price: Freeware **Requires:** Windows NT 3.1 or higher, 16MB of RAM **In short:** HTTP Server for Windows NT is a bare-bones Web server that lacks crucial features like security and file restrictions. The server does support CGI 1.1, however, and you are provided with remarkably thorough documentation, especially for freeware. As a learning tool or in-house server, the EMWAC HTTP Server deserves at least a look.

European Microsoft Windows NT Academic Centre (EMWAC), Edinburgh University Computing Services, 30-38 George Square, Edinburgh EH8 9LJ Scotland; <http://emwac.ed.ac.uk>.

476 on reader service card

SUITABILITY TO TASK

	Power	Ease
Setup	Poor	Fair
Administration	Fair	Fair
Customization	Poor	Poor
Security	Poor	Poor

analytical tools aren't provided with the server code. You can track down third-party analytical tools, however.

There's no automatic DNS translation of entries with the EMWAC server, so you can't easily see exactly who is accessing your server. Error messages are shunted to the Windows NT Application Event Log. The information returned is adequate, noting the difference between problems with the server itself and error caused by bad user input.

WHY EMWAC?

Given its limitations, where might you use the EMWAC HTTP Server? It would be well suited for low-stress internal usage, where the TCP/IP network serves the needs of a workgroup or a small set of users. In this case, as the server isn't connected to the wider Internet, security wouldn't be a problem. (In this situation, it could also serve as a guinea pig while you determine your larger Web needs.) And if you put an EMWAC HTTP Server on the Internet, you could make it a standalone server containing nothing but Web pages to be distributed.

Still, for the money, you really can't argue with the EMWAC HTTP Server's limitations. And if you're looking to make a first step onto the Internet, however tentative, it's a good place to begin.

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Media type	Plain paper Glossy paper and transparency	Laser paper Special paper and transparency	Plain office text and cover papers, and transparency
Print time	1-2 minutes/page	2 pages/minute	4 pages/minute
Resolution	360 dpi	600 x 300 dpi or 300 dpi	600 x 300 dpi or 300 dpi
Cost Per Page	Low - Mid	Mid	Low



Phaser 140

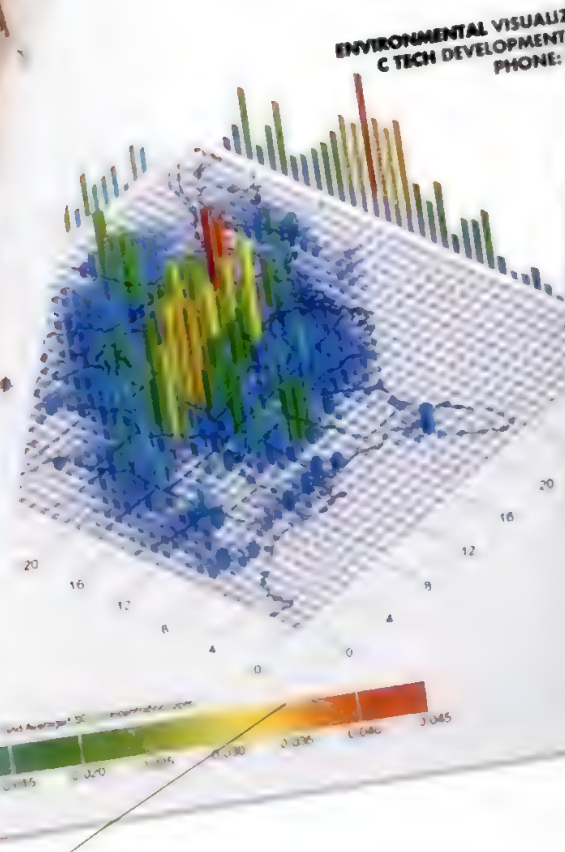


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and transparency

2 minutes/page

300 dpi
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Why We Couldn't Test Server Performance

What is good Web-server software performance? Is performance really a significant issue? It all depends on what your server software does and how fat your Internet pipe is.

There's currently very little agreement in the Internet industry as to what constitutes good performance in an HTTP (Web) server. Moreover, there's no clearly appropriate methodology for testing this.

What is clear is that raw processing speed ought to be far down on the list of criteria for selecting Web-server software; it should be an issue only for those dealing with heavily taxed servers. For the vast majority of Web-server installations, ease of setup and administration and the power of hooks to back-end processes far outweigh speed in terms of importance.

Superficially, a Web server functions very much like a LAN file server: Clients request documents and images; the server finds them and sends them out to the clients. In reality, most Web servers handle much smaller data sets than most file servers, and most clients access the server through a small number of entry points. This makes Web servers much more efficient in caching data than the average LAN file server. In fact, given sufficient bandwidth, intelligent Web servers' cache routines could easily analyze client access patterns heuristically in order to read ahead to the next likely page.

On the other hand, servers at sophisticated Web sites typically have a lot

more work to do: Many of the requested pages aren't simply stored on the server but involve calls to back-end server processes that construct content on the fly and pass it back to the server, which, in turn, sends it out to the client. On some Web servers, these processes can be complex databases that tax a server's processor, memory, and disk subsystems.

Earlier generations of HTTP server software could be swamped by large numbers of connections because they relied on Unix fork operations to create separate processes to service each request. Forks are highly resource-intensive, and the overhead involved in servicing large numbers of users can consume so much memory that the server must swap to disk.

Today's server software typically uses more lightweight threads to service user requests. Even so, developers have learned not to overdo the number of active threads. Netscape's servers, for example, let administrators set the minimum and maximum number of threads the software can allocate.

The industry has seen some early attempts to develop Web-server benchmark tests. Silicon Graphics, for example, has developed WebStone, which uses an isolated IP network with clients and a control station (the "WebMaster"). The clients launch request applications ("WebChildren"), which request data from the server. But SGI is clear that this benchmark test measures performance of HTTP (the transport protocol itself) only and not other variables affecting the server as a whole.

If your Web server won't be heavily taxed, you probably won't have a performance problem. But if you're expecting hundreds of thousands of hits per day, try to evaluate performance with your specific data in mind. Unfortunately, there aren't any good generic guides out there for you yet.

Netscape Communications Corp.

Netscape Communications Server Netscape Commerce Server

By O. RYAN TABIBIAN



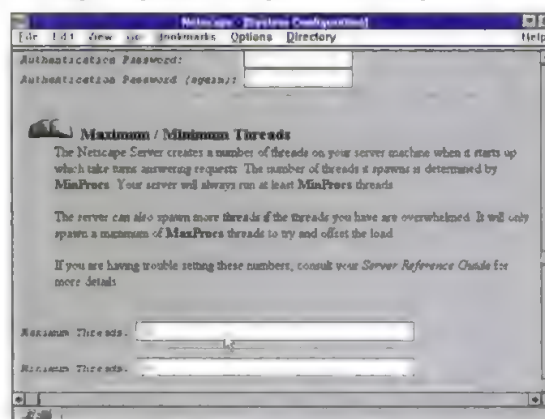
Netscape's Web servers are perhaps the most popular on the market. To the chagrin of many potential users, however, until recently the product has been available only on a variety of Unix platforms.

Fortunately, that's changed with the recent release of Netscape's server for Windows NT. Netscape has managed to successfully port the application to Windows NT while maintaining most of the features that made the Unix version so popular. (Incidentally, it runs on both Digital Alpha and Intel x86 processors.) For those who crave the power of Unix combined with the usability of Windows NT, this product is an excellent solution.

Like its Unix counterpart, the product comes in two versions, Netscape Communications Server 1.1 (\$795) and

Netscape Commerce Server 1.1 (\$2,995). The Communications Server, which is the basic HTTP engine, boasts many of the noteworthy features found in the well-established Unix version, such as an intuitive installation routine, simple management tools, scalable design, and a set of APIs to simplify the development of enhancements to the server. The Windows NT version also supports many extended features, such as image maps, CGI scripts, MIME map-

pings, and URL redirection. Perhaps most importantly, the product incorporates a new dynamic thread-management feature that promises to conserve valuable resources and thus improve the server's performance. The Commerce Server is essentially identical to the Communications Server except that it adds Secure Sockets Layer (SSL) security to the mix, for performing secure transactions over the Internet.



Configuring the dynamic thread management feature of Netscape's Commerce Server and Communications Server is quite simple.

EASY START

Installing and configuring the Netscape Communications server is a breeze—especially compared with other Windows NT-based web servers, such as EMWAC. In fact, we had the Communications Server up and running in a matter of minutes. All that was required was running an installation program from the Netscape CD-ROM and configuring several server parameters via the Netscape Navigator.

Installing the Commerce Server requires two additional steps for configuring the securi-

▶ FACT FILE

Netscape Communications Server 1.1, Netscape Commerce Server 1.1

List price: Communications Server, \$795, Commerce Server, \$2,995 **Requires:** Windows NT 3.5 or higher, 16MB RAM, 30MB hard disk space **In short:** If you are looking for a robust, scalable, and full-featured Web server for Windows NT, you will be hard-pressed to find a better solution than Netscape's Communications Server and Commerce Server. They retain most of the Unix versions' powerful features, including simple installation, strong management tools, and a strong set of APIs. The addition of dynamic thread management stands out among the features in the Windows versions of the servers, and security in these versions also remains effective. Netscape's Windows NT servers provide an excellent solution for those who lack knowledge of Unix-based servers.

Netscape Communications Corp., 501 E. Middlefield Road, Mountain View, CA 94043, 415-528-2619, fax, 415-528-4120

477 on reader service card

SUITABILITY TO TASK

	Power	Ease
Setup	Excellent	Excellent
Administration	Good	Excellent
Customization	Good	Good
Security	Good/Fair ²	Excellent

Commerce Server ¹ Communications Server

ty portion of the product. First, during installation you generate a private-key/public-key pair. The public key, as the name implies, is known to the rest of the world and acts as your identifier. It is also used to exchange session keys, encrypt the data, and authenticate the digital signature. The private key is only known to you and is used, in conjunction with the public key, to decrypt session keys.

The second part of the process is obtaining a digital certificate (an extra-cost item) from a third-party certification authority (CA) such as VeriSign, a subsidiary of RSA Data Security. The digital certificate is a sort of electronic business license, the main function of which is to prove a business's legitimacy to on-line customers. The CA investigates and authenticates the entity requesting the certificate, so that users can be sure that the server they are establishing a secure session with is not fraudulent.

SMOOTH RUN

Netscape's Windows NT servers provide a robust and scalable platform—similar to

that offered on the Unix front, since it has many of the same capabilities such as multithreading, preemptive multitasking, and a multiprocessing kernel. But Netscape improves on this: To best utilize Windows NT's multithreading feature—better handling HTTP requests and improving performance—it uses a dynamic thread-management system. Here's how it works:

In a typical Web server, each incoming HTTP request is handled by a separate thread; as requests proliferate, the server software generates new threads to handle them, a highly resource-intensive process. The Netscape server, however, allows the administrator to predefine a set number of threads, so that the server doesn't have to divert valuable resources to this task during heavy usage. The more threads, the better the server's performance. Since each thread can take from 4K to 200K of memory, however, the maximum number of threads depends on the amount of memory available to the server. The dynamic part of this system is that Netscape scales back the number of threads when the server is idle to preserve resources for other applications.

Unfortunately, the products don't offer either guidelines or safeguards for determining the maximum or minimum number of threads. For instance, in our testing we set the maximum number of threads to 10,000, a parameter well above the resource capabilities of our server. While the server still functioned, we encountered a few random errors. An application to calculate the amount of memory in your server and to suggest optimum settings would be a welcome improvement.

BUILD TO SUIT

To simplify the development of custom applications for your Web server, such as database query tools, Netscape includes a set of APIs, the Netscape Server Application Programming Interface (NSAPI). Traditionally, such enhancements and customizations (search engines and custom forms, for example) have been built using CGI scripts, written in programming languages like C/C++ or scripting languages like Perl.

While CGI offers benefits such as simplicity and flexibility, it has a large overhead, because each script requires a sepa-

rate thread to execute. With NSAPI, you can not only use programming languages like C/C++, but you can also take advantage of more Windows-based development environments such as Visual Basic to create custom features for your Web server. Furthermore, according to Netscape, applications developed under NSAPI require fewer server resources to execute than do CGI scripts.

Management is another strong suit of the Netscape servers. All server-management tasks are handled through a graphical forms-based utility, via Netscape's browser. This utility can start and stop the server, assign port number, check error logs, and set access control—all with a click of a button. In the case of Commerce Server, you can also create private and public key pairs, and import the digital certificate using this GUI. And believe it or not, you can do all this from anywhere on the Internet.

The other side to this incredibly easy server-management scheme, of course, is the need for effective security. Fortunately, Netscape offers several security options, such as user passwords, restricting access by IP address, and setting a special port number for management (presumably known only to the administrator).

Netscape's Windows NT servers are an excellent choice for those who want to run a robust and scalable Web server but don't have Unix expertise in-house. They also offer some innovative performance advantages and the extensibility of an application programming interface.

Process Software Corp.

Purveyor

BY KEVIN REICHARD

If it were a huge improvement over the original HTTP Web server from EMWAC (on which it's based), complete with all the high-powered tools needed to set up and maintain a Web site, Purveyor 1.0 from Process Software Corp. might be worth your attention. But with a list price of \$495 and rather limited capabilities, it doesn't offer tremendous bang for the buck when compared with other packages reviewed here.

PERMISSION GRANTED

Purveyor's most noteworthy feature, and the one that most distinguishes it from the

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freely available HTTP, is its extensive permission-setting capabilities, which form the basis of its security mechanisms. You can set permissions for every file, directory, group of files, or group of directories on your data structure and associate them with a wide range of criteria.

Purveyor accomplishes this through access control, which can be set up through four criteria: the type of access (you can accept or reject users or groups), the access method (you can allow or deny the ability to read or change files), access based on a specific user or group, and access based on specific IP addresses or a range of IP addresses.

CONTROLLING INTEREST

Because wildcards are supported throughout Purveyor's access-control configuration, you can do almost anything (especially when denying access to a range of IP addresses), and of the reviewed products, only WebSite offers more extensive access-control capabilities. For example, you can grant permission to a management group to access a file while totally denying access to another specific user or set of users using a range of IP addresses. You can limit the actions of a certain set of users (using the HTTP GET, POST, and HEAD commands). And you can turn off any directory browsing whatsoever, which means the only access is to the data directory containing your core HTML files.

Purveyor gracefully handles file permissions by placing the necessary tools

under a menu in the Windows NT File Manager. From here, you can review the existing file permissions (deleting or editing them as necessary) and set up new permissions. You can create a summary of all the file permissions on a given file system or a subsection thereof, or you can view the permissions associated with a specific file or directory.

Purveyor can also be set up for use as a proxy server for outgoing HTTP, Gopher, and FTP requests. (A proxy server is software that's put in place, for security reasons, to manage requests from your network to the wider Internet.) Users then set up their browser or Internet software to go through the proxy server, rather than some other Internet address. A proxy server should be able to block requests to specific IP addresses (so that no one can access www.penthousemag.com or similar pages from your network site, for example), and cache control makes sure the system doesn't get bogged down with too many outgoing requests.

SOME DRAWBACKS

Even with its extensive permission-setting capabilities, Purveyor can't be grouped with the elite when it comes to overall network security. The product doesn't support advanced security tools like Secure Sockets Layer (SSL) found in the Netscape Commerce Server, The Internet Factory's Commerce Builder, or various UNIX-based servers, and because you can't assign a separate password to the

Purveyor administrator, anyone who hacks into Administrator mode in Windows NT will have full access to Purveyor administration.

In all other respects, Purveyor must be viewed as little more than a basic Web server, lacking some needed functionality. It doesn't give you the tools to create or edit basic Web pages, nor does it include a Web browser. (Purveyor does include a form that can be used to review the elements of other HTML forms and Internet functions, but in general, anyone looking for basic page-creation capabilities will need to look elsewhere.) You can't add trailers or signatures to existing Web pages, nor can you create templates for other

► FACT FILE

Purveyor 1.0

List price: \$495 **Requires:** Microsoft Windows NT 3.5 or higher, 16MB of RAM, 4MB of hard disk space.

In short: Purveyor adds on the basic HTTP Server for Windows NT with security features and a better configuration process. Security is set through access control. You can control the type of access and the access method (allow or deny the ability to read or change files), and you can allow or deny access based on a specific user, group, or Internet Protocol address. But Purveyor doesn't support advanced security tools like Secure Sockets Layer. Purveyor is somewhat overpriced in the light of what you get, however, especially in this extremely competitive arena.

Process Software Corp., 959 Concord St., Framingham, MA 01701, 800-722-7770, 508-879-6994, fax, 508-879-0042

478 on reader service card

SUITABILITY TO TASK

	Power	Ease
Setup	Fair	Good
Administration	Poor	Fair
Customization	Good	Fair
Security	Fair	Good

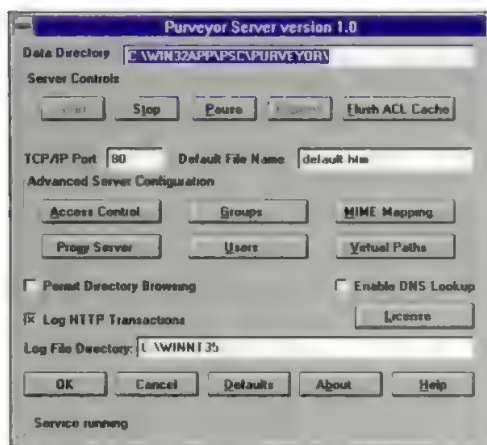
Web pages or configurations. Purveyor does support parsed HTML pages, although the documentation assumes you already know what you're doing.

Managing your Web pages is another issue that Purveyor doesn't adequately address. Aside from using the File Manager to view your directory structure, Purveyor gives you no way to graphically represent the pages on your Web server. More importantly, you can't index your Web pages, either for internal searching or for creating an index of Web pages for end users. (Administrators of larger sites know how crucial this indexing is for maintaining a Web site.)

Analytical tools are lacking: You can log accesses to your server, but you can't analyze the contents of the logfile within Purveyor. (But as the logfile is in the Common Logfile Format, some third-party tools are available for analyzing its contents.) And the printed documentation is rather Spartan (covering a measly 67 unindexed pages), although on-line documentation is a little more extensive.

SLENDER SCRIPTING

Purveyor does have rudimentary support for CGI scripting. But you're limited to character-based Windows NT .EXE files



All system administration under Purveyor 1.0 takes place in this dialog box. Notice that configuration options include proxy-server usage.

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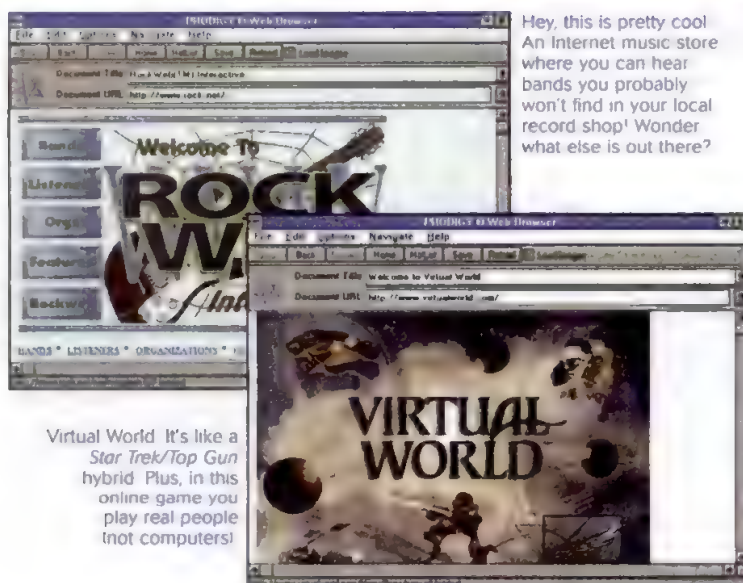
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SUMMARY OF FEATURES

Windows NT-Based Web Servers



■ YES ■ NO

Products listed in alphabetical order

	Commerce Builder	HTTP	Netscape Commerce Server	Purveyor	WebSite
List price	\$995; Communications Builder, \$495	Free	\$2,995; Communications Server, \$795	\$1,995	\$499
Installation and Maintenance					
Graphical installation process	■	■	■	■	■
Hierarchical display of directory tree	■	■	■	■ ¹	■
Actions associated with file type	■	■	■	■	■
Actions associated with headers	■	■	■	■	■
Graphical maintenance tools	■	■	■	■	■
User directories	■	■	■	■	■
Documentation					
Help in Windows Help format	■	■	■	■	■
Help in HTML format	■	■	■	■	■
Printed manuals	■	■	■	■	■
Tools Included					
Browser	■	■	■ (Netscape Navigator)	■	■ (Enhanced Mosaic 2.0)
FTP/Gopher or Jughead/WAIS	■ ■ ■	■ ² ■ ² ■ ²	■ ■ ■	■ ■ ■	■ ■ ■
Search engines	■	■ ²	■	■	■
Mail (SMTP/System log)	■ ■	■ ■	■ ■	■ ■	■ ■
CERN or NCSA log format	■	■	■	■	■
Security					
Groups	■	■	■	■	■
File-access control	■	■	■	■	■
IP-based access control	■	■	■	■	■
Host name-based access control	■	■	■	■	■
Redirection	■	■	■	■	■
SSL/S-HTTP / User passwords	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Miscellaneous					
Maximum number of threads	Depends on RAM	N/A	Depends on RAM	N/A	N/A
CGI compliance (version number)	1.1	1.1	1.1	1.1	1.2
HTTP compliance (version number)	1	1	1	1	1
ISMAP support	■	■	■	■	■
MIME mapping	■	■	■	■	■
Can function as a proxy server	■	■	■	■	■

N/A—Not applicable; The product does not support multithreaded operation

¹ Purveyor uses the Windows NT File Manager. ² ENWAC offers these tools separately as part of an Internet suite.

as CGI scripts, because Purveyor adheres to older CGI standards (Version 1.1). A search engine is also conspicuously missing, though the on-line documentation does discuss how to set up a WAIS server in conjunction with Purveyor.

Still, for the same money, you could be looking at the purchase of a much more full-bodied Web server like WebSite. Purveyor lacks the page-management and development tools found in many other Web servers, making it a lesser alternative than the leading products reviewed here. Note, however, that just before press time, Process Software announced an upgrade to Purveyor 1.0. See the sidebar "Too New to Review" for details.

O'Reilly & Associates Inc.

WebSite

BY KEVIN REICHARD

Given its background as a publisher of programming books, it should come as no surprise that O'Reilly & Associates has come out with a Web-server package—WebSite 1.0—that stresses extensibility through programming and scripting. What is surprising, though, is the relative strength of the total server package. The amount of functionality that WebSite delivers makes its \$499 price a modest one, and it makes the product as strong a choice for those who don't care about extending their Web server through programming

as it is for those who do.

WebSite's strength lies mainly in the range of Web tools it has to offer. Its strength begins with a robust HTTP server that has enough configuration options (time-outs, aliases, logfiles, and security) to please most, if not all, Webmasters. But WebSite also provides purchasers with a host of other useful Web management tools.

TOOLBOX

WebView, for example, presents a graphical, hierarchical view of the Web server's contents. This can be toggled by several categories, including directory location, URL, title, and label.

Perhaps the most useful tool of all is hyperlink, where WebView maps all links descending from the first designated Web page. A Find Node command allows you to search for text within Web pages; you can narrow the search by title, filename, label, URL, or hyperlink, or search every Web page.

You'll need the hyperlink tool to discover all the hidden built-in links to O'Reilly resources on your own server, which points up a certain insidiousness in WebSite's out-of-the-box configuration: By default, the product assumes you want to load your server with links to various O'Reilly services on the Internet; some of the documentation is also linked to O'Reilly services. To use this product purely as an internal server or as a server unblemished by O'Reilly links, you'll need to spend some configuration time to avoid annoying error messages.

INDEXABILITY

Another tool, WebIndex, lets you create indexes of the entire server contents or of selected files. You can set these up as standalone Web pages (the better for users to browse through, especially at a crowded Web site) or incorporate them into other Web pages.

Although WebIndex isn't the most sophisticated of indexers—it only indexes a selection of pages or *all* pages, eschewing filters of any sort—it should serve the needs of many users.

The package is augmented by a trinity of useful documentation: a printed manual, Windows Help files, and HTML



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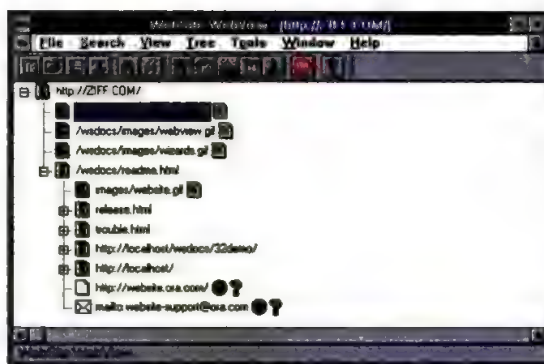
pages. The 324-page user manual covers all portions of WebSite and offers particularly strong guidance in using WebSite as a development platform.

EXTENDING THE WEB

WebSite's main attraction for many World-Wide Web administrators will be its unparalleled strength as a development platform.

Conforming to common gateway interface (CGI) 1.2 specs, WebSite allows just about any program or script to be run under the CGI. WebSite's CGI support is broken down into three categories: Windows CGI (which includes Visual Basic, Visual C++, and DLL programs); the Standard CGI, which derives mainly from the Unix world (covering Perl, Unix Bourne/Korn Shell, and Tool Control Language [TCL] scripts); and the DOS CGI (DOS programs running under a DOS shell). You can also define a Windows NT script (.cmd) as a CGI event.

The obvious attraction—especially for Perl scripts—is the ability to take an existing Unix server installation and ei-



WebSite's nifty WebView application graphically displays all your World-Wide Web pages and shows how they are related to each other.

ther move it to or replicate it on a Windows NT system. The only drawback is that the development tools needed for standard CGI development (Perl, shell, and TCL) don't ship with WebSite. But they are available as shareware on WebSite Central at <http://www.ora.com>.

The script examples that ship with WebSite (which are well explained in the documentation) illustrate how you can truly extend the power of the World-Wide Web with CGI scripting. Something as simple as creating forms is a matter of CGI scripting, for example. Several Visual Basic scripts are used to show how to display forms to browser users, determine the next action based on a user's input (ranging from changing content types to redirecting the browser to another URL), and, if necessary, translate the input to a database of some sort.

And there's one more script that you'll probably find useful, though you'll never show it to your users: statistical analysis of the user log through VB Stats, a Visual Basic script available on WebSite Central or from WebSite technical support. (You need to register to gain access to this support.) VB Stats takes output from the user log (which stores transactions in the Common Logfile Format) and breaks the data down into access attempts, IP tracking, and more.

Another menu item that ships with WebSite, QuickStat, sums up the number of users accessing the site, documents served, average per hour, and so on. Finally, there's a server log that covers the HTTP protocol number associated with a request, sent data, image-map

tracing, CGI tracing, access control, and authentication. (This server log is flushed whenever a server is shut down, however.) All these tools add up to top-notch tracking of server performance and transactions.

AN INSECURE FEELING

Creating interactive forms (which involves users running programs on your server and displaying the output to a browser) raises a sensitive issue that WebSite isn't fully capable of addressing—security. Like the majority of Windows NT-based Web servers, WebSite addresses security primarily on the file and directory level: Users (either explicitly named or defined by IP address) are authenticated to perform specific HTTP transactions (GET, POST, and HEAD) on specific files and directories.

WebSite goes a step or two beyond these measures by increasing the complexity of permissions (by adding *realms* to the permission hierarchy, above *groups* and *users*) and by adding a password for the administrator. But WebSite

*The script samples
that ship with WebSite
illustrate how you
can truly extend the
power of the Web with
CGI scripting.*

doesn't address security on the transaction level. This release doesn't support the Secure Sockets Level or Secure HTTP (though support for S-HTTP is promised in Version 1.1, expected this fall), which should raise a red flag for those who need secure Web transactions. You also can't use WebSite as a proxy server, but Version 1.1 will offer proxy support.

Security aside, WebSite 1.0 is a well-rounded product that should fill the needs of a great many users. If you're thinking of extending your server via programming or scripting, it should top your shopping list.

► FACT FILE

WebSite 1.0

List price: \$499 **Requires:** Windows NT 3.5 or higher, 12MB of RAM for Windows 95, 5MB hard disk space **In short:** WebSite is a developer's dream, offering a full set of tools and examples in interactively extending the Web server. And it includes enough Web-management tools to keep even the fussiest Webmaster satisfied. But because it lacks multithreading and relies on CGIs (APIs provide better performance), it thrives more in small to medium-size environments. Still, WebSite gives you much for your money: great documentation, lots of sample CGI scripts, and a noteworthy organizational viewer.

O'Reilly & Associates Inc., 103A Morris St., Sebastopol, CA 95472; 800-932-9302; 707-829-0515; fax, 707-829-0104

479 on reader service card

SUITABILITY TO TASK

	Power	Ease
Setup	Good	Excellent
Administration	Excellent	Excellent
Customization	Excellent	Good
Security	Fair	Good

Turnkey Solutions: One Stop Shopping

AS THE INTERNET RAPIDLY evolves into the next publishing frontier, tens of thousands of businesses with something to say to the world are seeking affordable ways to enter this new electronic paper-space—above all, the World-Wide Web. There's a wide spectrum of options, from farming the whole process out to consultants and service providers to assembling the necessary hardware and software and building a site yourself. But is the do-it-yourself approach feasible for nonexperts? And if it is feasible, what's the most advantageous platform to do it on?

A couple of years ago, building and maintaining a Web presence required a lot of technical expertise. The only servers available ran on Unix; if your business was not already Unix-savvy, you had to make a major investment in time and resources just to get into the game.

Today, servers are available for many platforms, and hardware/software vendor solutions put server setup and management well within the reach of those with only modest technical knowledge. As a do-it-yourselfer, you'll still have to build appealing content to get the positive visibility you want on the Web, but today's turnkey server solutions help you focus on that task by hiding the intricacies of server management behind clever setups and intuitive configuration interfaces.

THE PLAYERS AND THE CHALLENGE

We reviewed turnkey Web-server solutions from four different vendors: Digital Equipment Corp. (Digital), Intergraph, Silicon Graphics (SGI), and Sun Microsystems Computer Co. These systems included workstations running Unix (Digital, SGI, and Sun) and an Intel-based PC running Windows NT (Intergraph).

A ready-to-run hardware/software solution can get your Web publishing operation off the ground in no time.

By Sean González

All solutions incorporate the Netscape Communications Server package.

Rather than specifying a particular system from each vendor, we mapped out scenario requirements and let the vendors send the systems each felt was most suited for the task.

We targeted Web servers that could handle a medium traffic load (roughly 250,000 connects per day) and support HTML 2.0 and 3.0 features (graphics, CGI scripts, forms, and tables), "server-side includes" (parsable HTML), and Netscape-specific features (that is, the Netscape API functions).

Our review evaluated five aspects of these turnkey systems: installation and setup, configuration, documentation, security, and extended functionality. Although we were eager to run formal performance tests, an impartial methodology for doing this has yet to emerge. Still, we did run some informal server-performance tests, though, and found the Intergraph solution to be approximately 5 to 10 percent slower than the other systems; we attribute this to a combination of the Pentium's slower I/O bus and the immaturity of the Windows NT TCP/IP stack.

INSTALLATION VARIATIONS

Of the four vendors, only Intergraph included a clear and easy-to-follow road map or checklist for setting up the system. But the remaining vendors typically expect you will purchase their solutions through a value added reseller (VAR), who would normally be responsible for helping you install and configure the system. In our judgement, however, these solutions are easy enough to install that, with the possible exception of the Digital system, most purchasers could probably get them set up, even without the assis-

tance of a VAR, in an hour or less.

System documentation, whether printed or electronic, ranged from meager (Intergraph) to confusing (Digital) to good (Sun), but none was outstanding. Fortunately, unless you manage to lose the entire contents of your system and need to rebuild it from scratch, you should be able to configure and run your system with the documentation provided.

Sun's inclusion of O'Reilly & Associates' *Managing Internet Information Services* is noteworthy. This book is an excellent resource for gaining a deeper understanding of the inner workings of servers and their underlying technologies; it's also helpful if you want to add functionality.

FORMS OF CONFIGURATION

Netscape uses HTML forms to configure and manage its Netscape Communications Server software (tested with all four systems). Sun and Digital have adopted this model, using HTML forms to perform all system and server-software configuration and management functions. The result is a tremendous reduction in the Unix proficiency required to manage and maintain these systems.

The Intergraph solution, too, is easy to configure and manage, but the company didn't have to do any special work to achieve this: Windows NT's graphical interface makes server management inherently easy. The SGI system is a bit of a hybrid: It doesn't use forms to carry out systems management, but many of its tools trigger Windows-based applications to perform Unix system tasks—a definite improvement over the bare system prompt and command line.

INSECURITIES

The weakest aspect of all our turnkey solutions is system security (as opposed to transaction security, such as handling credit card purchases and the like over the Internet). The perils of security breaches are real. Anyone penetrating your networks may be able to access sensitive data. Or, if someone breaks into your system and modifies your content, you could be held liable for what goes out on the Web under your name.

These vendors' approaches to security range from not visibly dealing with it (In-

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Netra Internet Server

Each of the turnkey Web-server solutions we reviewed had definitive strong points, and each deserves mention here. But only one product—Sun Microsystems' Netra Internet Server—combined

power and extensibility with easy setup and management.

The Netra has more than enough processing power to handle the 250,000-hit-per-day traffic load we targeted in our testing, and as a multi-processor-capable system (the only one in our test suite), it can be easily equipped to handle twice that traffic volume or to manage searchable content in addition to HTML processing.

The Netra's software suite makes it a full-featured Internet services and connectivity solution. Its Internet services include Netscape Communications Server, telnet, FTP, and a bunch of e-mail services: POP2, POP3, IMAP, and Sendmail v8 mail servers. And its management tools relieve you of much of the headache of setting up and maintaining a Web site. In partic-

ular, its simple system-recovery procedures will help you restore your visibility on the Web quickly should problems arise.

Although Intergraph's Web Server 10 couldn't be easier to manage and has clear cost-savings advantages (especially for those who already run Microsoft products), it's quite short on functionality at this point. Digital Equipment Corp.'s Internet AlphaServer promises to be a powerful, highly extensible, and easy-to-manage system. It's on the right track to earn an Editors' Choice in the future, but the product is not yet complete.

Silicon Graphics' WebForce INDY is wonderfully equipped for content building but does less than the others to relieve you of having to focus on server management and maintenance issues.

tergraph) to giving bad advice on how to manage your system (Sun). They all make an effort to address security issues, but none has created a solution that is a clear result of solid experience in dealing with Internet security.

You should be concerned about security on the Internet. It will be well worth the effort required to become thoroughly familiar with Internet security issues before you "go live" with your new system. For the vendors that work with them, VARs should be good resources for developing adequate security provisions for Web publishing operations.

BEYOND VENDOR PACKAGES

Several practical issues not directly related to the makeup of the vendors' product offerings will also have their impact on the success of your on-line publishing activities.

First, make sure you have adequate bandwidth in your Internet connection to support the kind and volume of Web traffic you anticipate (or hope for). A slow or

unresponsive site can give you a bad reputation on the Web, as users get exasperated while waiting for your pages to come up. If you ignore slow connectivity problems, your Web presence could hurt you more than help you.

Second, equip your server with as much memory as you can afford; this can make for a big performance improvement. Maxing system RAM helps cache as many pages as possible, which in turn reduces dependency on the I/O subsystem's ability to handle high throughput.

If you're planning to run a search engine on your server, consider a computer system that supports multiple microprocessors. Search engines gobble processor power.

Finally, make sure to ask your VAR about upgrade costs and options. Can you add as many disks, as much memory, and as many CPUs as you want; or will you need more servers to expand and support your Web publishing presence?

THE BOTTOM LINE

All the vendors in this review have put real effort into building turnkey solutions that provide functional, reliable, easy-to-use Web servers. But these products have not been simplified to be interchangeable and to only differ in quality. You need to make a sound, educated purchase decision to best allocate your time, energy, and money for building your presence on the World-Wide Web.

Intergraph Inc.

Web Server 10

BY SEAN GONZÁLEZ

Web Server 10 from Intergraph (\$4,495, or \$3,995 without the quad-speed CD-ROM drive and 14-inch color monitor) is a simple, cost-efficient, and powerful Windows NT Web server that rivals the performance of Unix Web servers for low to medium traffic loads. Although this package lacks most of the bells and whistles found on the other systems we reviewed, it's a reliable solution that should have you up and running on the Web in a short time.

Setting up the system is a no-brainer. After making all cable connections and hooking up an enviable multimedia keyboard (which includes speakers as well as microphone and earphone jacks), we



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PC MAGAZINE EDITORS' CHOICE - MAY 30, 1995

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Tech Support Average Response Time

Based on average of desktop and notebook scores.

Source: July 1995 PC Magazine

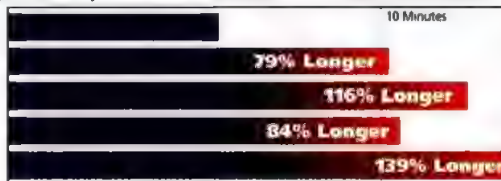
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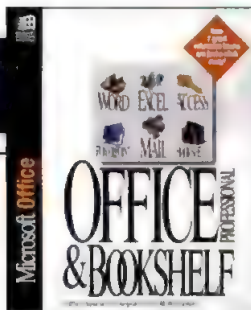
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* IPC Technologies, Inc. internal reporting indicates an average response time of under 2-minutes. Industry average is 8.7 minutes. Actual times may vary.



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CIRCLE 012 ON READER SERVICE CARD

turned on the system to complete the configuration tasks, which are clearly outlined in the package's installation and configuration notes.

These configuration notes are a complete, easy-to-follow road map to integrating the system into your network, using the Windows NT configuration routines. Once this task is completed, you proceed to configure the Web server software itself.

We were impressed by the Windows NT version of the Netscape Communications Server 1.1. It contains most of the functionality of its Unix counterpart, in-

cluding the ability to run multiple concurrent copies of the server (using Windows NT threads) to enhance server performance. Noticeably missing, however, is multi-hosting support. Until Netscape provides this functionality (we're told it soon will), this solution will not work for those who need to run multiple Web servers (with different names and IP addresses) off one computer.

EASY DOES IT

To install and configure Netscape Communications Server, you simply click the configuration icon. The rest is automatic.

(The Windows NT and Unix versions of the Netscape server use identical configuration procedures and screens; if you can handle one, you can handle the other.)

Web Server 10 comes with system hardware manuals and OEM versions of the Windows NT and Netscape Communications Server manuals. Although we didn't need the manuals at all to get the server up and running, when we needed specific information about the functionality of the Netscape server we were at a bit of a loss. Fortunately, the complete Netscape documentation is included on-line,

Win 3.1x Servers: A Web Site on Every Desk

By O. Ryan Tabibian

With the rising popularity of Web publishing, Web server products are popping up on a number of platforms, now including even Microsoft Windows 3.1x. Recently, several products that will turn your Windows 3.1 machine into a genuine Web server have been released.

It's not surprising that Windows 3.1-based servers haven't made an earlier appearance. As a Web platform, Win 3.1 has a number of shortcomings: It's an unstable operating environment with poor resource allocation and poor network performance. Nevertheless, with the evolution of in-house or departmental information servers running on TCP/IP networks, products like this have a place.

We looked at two Windows 3.1x server products: NetManage ChameleonNFS Personal Web Server and Quarterdeck WebServer. Our evaluation considered factors such as feature set, functionality, and ease of use.

NETMANAGE

Personal Web Server, from NetManage (408-973-7171), is one among 40-some connectivity tools included in NetManage's TCP/IP Applications for Windows, Chameleon NFS (list price,

\$495). It is installed automatically when you run the rather complex setup routine for the complete package. Don't look to the documentation for much help with setup, by the way.

While it certainly does serve up HTML files, Personal Web Server is quite basic. It has no security provisions or access control of any kind, but

Webmasters than as a serious work-a-day tool. It would certainly work fine to check out a personal HTML home page you'd built for yourself.

QUARTERDECK

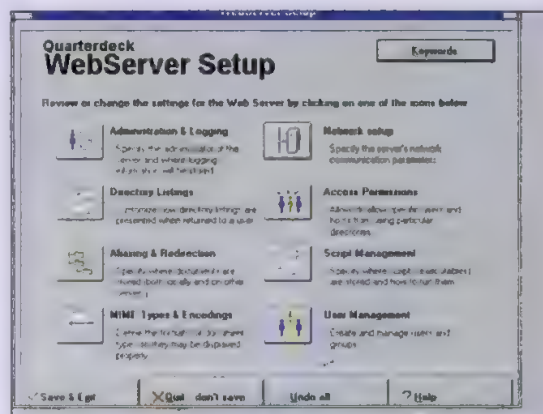
By contrast, the Quarterdeck WebServer, from Quarterdeck Corp. (estimated street price, \$129; 310-392-

9851), is clearly built for real-world use. It's easy to install and configure, and it contains an intuitive management tool through which you can handle all aspects of the server, including network configuration and user management.

WebServer (which comes with the LAN WorkPlace TCP/IP stack) has password-based access control and multithreading (it supports up to 16 simultaneous connections), along with a number of fairly advanced features such as image mapping and MIME support. Perhaps most important, it supports both DOS and Windows

CGIs and provides fairly detailed discussion of CGI scripting along with several sample scripts.

Quarterdeck is clearly the choice if you want to run a real Web server in Windows. But for complete Internet connectivity, NetManage's Personal Web Server will give you some basic Web experience in the bargain.



This intuitive yet powerful configuration and management console is the base of operations for all Quarterdeck WebServer setup operations.

it does offer extensibility via CGI and thus supports HTML forms. You configure the server via a simple dialog that lets you specify a communications port number, a document directory, and a default file (the "home page").

Our impression of Personal Web Server is that it's almost conceived more as training wheels for budding

SUMMARY OF FEATURES

Turnkey Web-Server Solutions

PC MAGAZINE
EDITOR'S CHOICE

■ YES ■ NO

Products listed in alphabetical order.

	Internet AlphaServer	Netra Internet Server	WebForce Indy	Web Server 10
List price	\$19,995	\$15,495	\$10,995	\$4,995
System Hardware				
Operating system	Digital Unix	Solaris 2.4 (Unix)	IRIX 5.3 (Unix)	Windows NT Workstation 3.51
Amount of memory tested	64MB	64MB	32MB	16MB
Maximum available amount	512MB	512MB	256MB	256MB
Amount of disk space tested	2GB	2GB	1.2GB	540MB
Maximum available amount	168GB	73GB	56GB	24GB
I/O bus type	SCSI	SCSI	SCSI	SCSI or PCI
CPU type/MHz	Alpha 21064/233	SuperSPARC II/75	R4600/133	Pentium/75
Maximum number of CPUs	1	2	1	1
Web Server Software				
Netscape Communications Server version	1.0	1.1	1.1	1.1
Graphics/forms/CGI scripts	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Server side included	■	■	■	■
IP-based access control	■	■	■	■
Host-based access control	■	■	■	■
User or password authentication	■	■	■	■
Public user directories	■	■	■	■
Templates/Multithreading	■ ■	■ ■	■ ■	■ ■
Customized error responses	■	■	■	■
GUI setup and maintenance	■	■	■	■
Default query handler	■	■	■	■
Multihosting support	■	■	■	■
Multiple servers in different ports	■	■	■	■
Common log format	■	■	■	■
Other Internet Servers				
FTP/News/E-mail	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Other servers	None	IP/IPX gateway	None	None
Additional Software				
Guided system setup	■	■	■	■
Authoring tools	■	■	■	■
GUI or menu-driven backup	■	■	■	■
Simplified system recovery	■	■	■	■
Enhanced security	■	■	■	■

N/A—Not applicable: The product does not have this feature.

in Post Script format; these files contained all the information we needed.

SECURITY CLEARANCE

The security provisions of Web Server 10 are frankly disappointing—or more accurately, nonexistent. It appears that Intergraph has left security entirely up to the operating system: a potentially dangerous situation.

Another disappointing aspect of this package is that, although it earned reasonably high marks as an HTTP server, it offers little more Internet functionality than that. The system ships with the Workstation version of Windows NT; if it included the Server version instead, additional Internet services would at least be possible. Moreover, the package would benefit from

the performance enhancements of the Windows NT Server. Before the end of the year, though, Intergraph plans to offer the bundle in a number of configurations, one of which includes Windows NT Server.

SILVER LININGS

On the other hand, the Intergraph package does include a copy of Microsoft Word, along with the Internet Assistant for Microsoft Word, an HTML-authoring tool. (See "Publish to the Web: No Experience Required," elsewhere in this issue, for a complete description of Internet Assistant.) Although it's debatable whether Internet Assistant is an ideal HTML authoring solution, you do get the tools necessary to build your content immediately without having to acquire additional software.

If, like most people these days, you plan to author your HTML content under Microsoft Windows and then upload it to a server, you can take advantage of Windows for Workgroups and Windows NT's drive-sharing capabilities to seamlessly move files into your Web server. Other solutions would require NFS, which would mean both purchasing additional software and dealing with irritating file-naming problems between PC and Unix hosts.

Another advantage of a Windows NT solution is that it's far easier and more cost-efficient to integrate the functionality of your existing applications into your Web strategy—assuming you run a Windows-based environment. For example, it is common practice to use Microsoft Access as a database search engine to deliver searchable content on the Web; the same functionality would require a far more expensive database solution if run under Unix.

To perform routine system management tasks (like creating user accounts, performing backups, and doing system start-ups and shutdowns), you'll have to rely on the tools built into Windows NT. A centralized interface (like the ones offered by Digital and Sun) to perform all these management tasks would be nice, but at least Windows NT simplifies them to the point where this should not translate into significant management overhead for you.

Although the server performed satis-

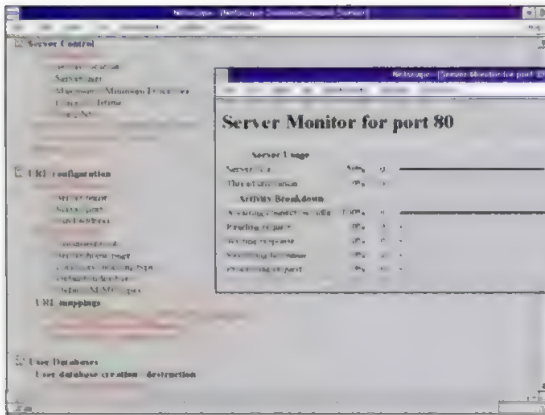
► FACT FILE

Web Server 10

List price: \$3,995 (includes 75-MHz Pentium processor, 16MB RAM, 540MB hard disk space, Netscape Communications Server 1.1, 14-inch color monitor, Microsoft Word with Internet Assistant). **In short:** Because it is a Windows NT solution, the Intergraph system offers PC compatibility with workstation performance; it also gives you a simple solution to dealing with tedious system-management tasks. Invest 30 minutes, on the average, to set up the hardware and software, and you will have a fully functional Web server running one of the most popular server software packages available, the Netsite Communications Server 1.1. Although not a complete Internet services solution, if you are looking for an affordable way to build your presence on the Web, the Intergraph will meet your expectations without compromises.

Intergraph Inc., One Madison Industrial Park, Huntsville, AL 35894-0001; 800-763-0242, 205-730-2000; fax, 205-730-6188; <http://www.intergraph.com>.

on reader service card



The Windows NT NetScape Server works just like the Unix version on Intergraph's Web Server 10. The configuration forms are identical, and you even get the server performance-monitoring tool.

factorily under medium-load conditions (250,000 connects per day), you may need to consider multiple servers or moving on to another platform as your capacity needs grow. With a 75-MHz Pentium CPU and the Windows NT Workstation TCP/IP stack (which is less efficient than most Unix networking solutions), Web Server 10 won't stand up to the high traffic demands (500,000 or more connects per day) of some Web sites.

The Intergraph Web Server 10 is a fine solution that will help you develop Web presence with minimal dollar investment and management overhead (albeit without much security). As we had anticipated, Windows NT Web servers are becoming viable alternatives to Unix solutions; Web Server 10 is living proof that it can be done.

Digital Equipment Corp.

Internet AlphaServer 1000

BY SEAN GONZÁLEZ

This is a power station, indeed! Flaunting its Alpha chip set, Digital impressed us with this 233-MHz Web server and integrated Internet services solution (\$19,995). For a company with such advanced hardware technology, however, Digital is somewhat lagging in the software end of the Internet business: The Internet AlphaServer 1000 we received for testing included the Netscape Communications Server 1.0, not Version 1.1 like the other three. The company announced its move to Version 1.1 just before press time, though, so current purchasers will

be up to date.

The Alpha Server is physically bulky; compared with the other turnkey systems we reviewed, but you can hide it under your

desk if you are constrained to keeping your server in an office environment. The Ethernet adapter included with the package has 10Base-T, BNC, and AUI connectors (whereas all other solutions support 10Base-T only); so you're pretty much guaranteed to be able to hook

LOCKER COMBINATION

The Alpha Server's configuration and management are handled (in a manner reminiscent of Sun's Netra solution) by Digital's Electronic Locker system-administration tool, which uses a graphical interface to guide you, step by step, through the various tasks. Extensive on-line help is always available, so you should have no problems using the tool.

The Electronic Locker, which assumes no Unix or system-management experience, allows you to manage user accounts and configure local printers and Usenet News. It also lets you perform backups, delete unnecessary files, and add storage to resolve disk-space problems. Unfortun-

nately, not all Electronic Locker functions are implemented yet; so you may need to use some Unix commands until the interface is completed.

The server is preconfigured by a VAR, so you don't have to worry about installing software. Be grateful; we read the system installation instructions and found

FACT FILE

Internet AlphaServer 1000

List price: \$19,995 (includes Digital UNIX V.3.2 operating system, 233-MHz Alpha 21064 processor, 64MB RAM, 2GB hard disk space, Netscape Communications Server 1.0). Color monitors: 15-inch, \$500, 17-inch, \$1,300. **In short:** This powerful workstation will doubtless meet your Web traffic needs today and well into tomorrow. With enough documentation and on-line help to satisfy the most demanding reader, you will have at hand all the information you need to build your Web server in no time. Its security features are geared towards ensuring your user environment does not compromise your Web presence, so this is a safe system to keep users and Web content together. Your users can use the system to read e-mail and Usenet News, and use a text-only Web browser. Although the server's existing server-management features are very good, this is still an unfinished product, so some Unix expertise is advisable to keep your system running in optimum condition.

Digital Equipment Corp., 111 Powdermill Rd., Maynard, MA 01754, 800-344-4825, 508-493-4076; fax, 508-493-2568, <http://www.digital.com>.

480 ■ reader service card

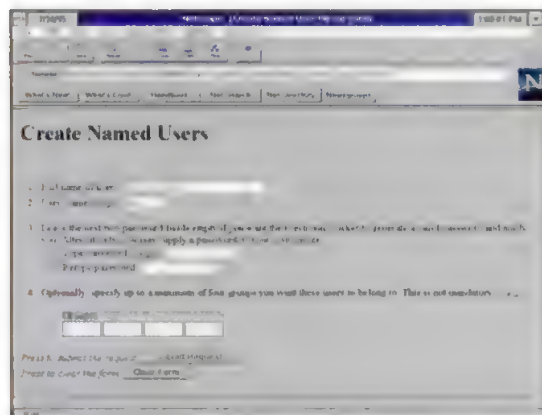
the process confusing and daunting. For this reason, we recommend that you keep your backups up to date; if you ever have to rebuild the system, you will probably have to call your VAR for assistance.

If there is such a thing as providing too much documentation, Digital is guilty of

it. The 10-inch-thick documentation set looks quite intimidating; but the truth is you really don't need it all. You will find the Netscape manual useful, though; from it, you can learn everything there is to know about your server. Although PostScript files to print a copy of the manual are available with all Netscape installations, Digital is the only vendor that provides a printed copy.

GET THEE BEHIND ME

Like the other systems we tested, the AlphaServer 1000 passed a SATAN scan with fly-



The Internet AlphaServer 1000 lets you create individual accounts and account groups via forms. If you can't come up with appropriate passwords, the system suggests them.



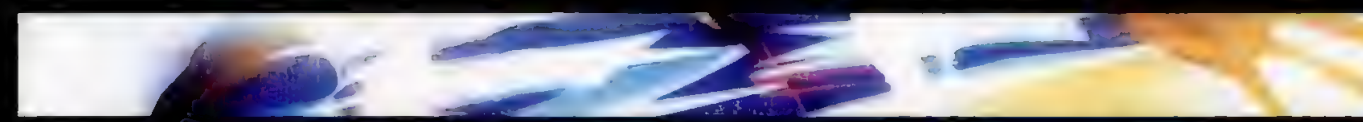
You get the mouse. Head up the screen.



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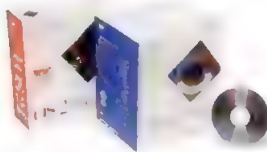
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The Apple Internet Server Solution

By O. Ryan Tabibian

Over the years, Apple Computer (800-776-2333) has been successful because it has consistently offered products that simplify day-to-day computing tasks. That is once again the case as Apple makes its first foray into the Web server market with a hardware/software package that combines WebStar server software from StarNine with its powerful Apple Workgroup Server. While it doesn't compete with the high end Unix or Windows NT products, this combination offers a fine solution to users looking for a simple way to provide Web services internally, or with performance limitations, over the Internet. (It's well suited for Web sites with low to moderate traffic levels.)

The Apple Internet Server is currently available in three hardware configurations. For our testing, we reviewed the high-end bundle built around the Apple Workgroup Server 9150/120 (\$8,209 list)—which sports a powerful 120-MHz PowerPC 601 processor—and WebStar, Version 1.0, from StarNine. The package also includes an HTML editing tool and a search engine.

Network performance has never been a strong suit of the Macintosh product line, as a result of both hard-

ware and operating system limitations. With the 9150/120 Workgroup server, Apple has delivered a powerful processor, but both the outdated NuBus architecture and the lack of support for preemptive multithreading in the operating system are potential performance bottlenecks. By early next year, Apple plans to rectify this

a number of clear improvements to the shareware, such as faster performance and easier and more robust management.

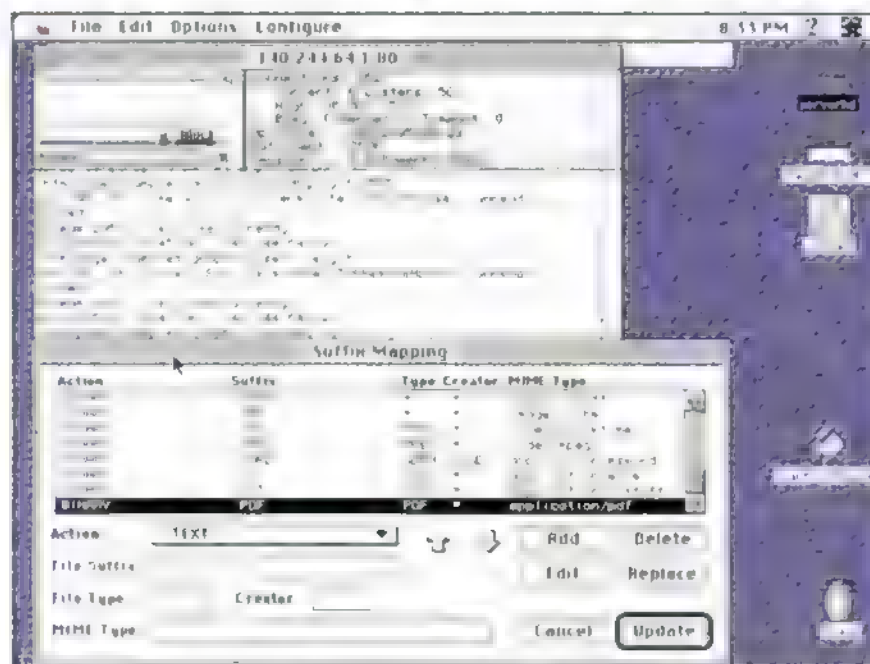
In fact, WebStar includes a new, intuitive tool for both local and remote management of the server. With it, you can monitor the status of the server, allow or deny connections, map binary

files, and manage multiple WebStar servers, all from within a single console. In addition, StarNine plans to add SSL security to the product in the near future.

Like many other Web servers on the market, WebStar supports advanced Web functionality through CGI scripts in a variety of programming languages, such as C/C++, MacPerl, and even AppleScript. StarNine has also dramatically improved the processing of CGI scripts. WebStar's shareware predecessor halted all other HTTP processes until a CGI script request was complete.

Today, WebStar can run multiple CGI scripts concurrently while servicing other HTTP requests.

Aside from the performance limitations that confine it to low- and moderate-traffic applications, the Apple Internet Server is a robust solution for either Macintosh shops or individual users looking for a simple yet powerful way to publish on the Web.



Apple's centralized management console provides a simple way to check the status of the server.

situation, with the implementation of the PCI bus and the release of the next generation of MacOS code.

WebStar is the only commercialized version of MacHTTP, the popular Macintosh Web-server software that is freely available on the Internet as shareware. (For the most recent release of MacHTTP 2.2, check out <http://www.biap.com>. WebStar makes

ing colors. The system includes screens to enhance security through IP packet filtering, but this solution lacks a tool that's easy to configure and manage, such as TCP wrappers, that will protect your server. Although the system is reasonably secure as is, it will be well worth your time to work with your VAR to ensure that additional security precautions have been taken to meet your company security standards.

One very positive security feature is the way the AlphaServer 1000 manages user accounts. The management panels create a default user environment that

locks users into a menu from which they choose to read mail or News, use the text-mode Web browser, change their password, or read the user manual. And the Electronic Locker won't let you create any accounts without passwords; in fact, it presents you with a list of automatically generated passwords if you don't supply one.

The AlphaServer 1000 isn't preconfigured as a mail server or FTP server, so you'll have to enable those functionalities on your own or get your VAR to help. Usenet News, on the other hand, is preconfigured, a mixed blessing. As long as

you use it for internal purposes only, you shouldn't have problems; should you choose to use your system as both a Web and a Usenet News server on the Internet, you may run into performance problems. Usenet News can be a highly resource-intensive service, so be judicious in your use of News on your Web server to avoid adversely affecting your Web presence.

Like Sun's Netra Internet Server, the AlphaServer 1000 does not address Web-content management and authoring problems; you have to work these out on your own (although Digital does supply names of companies that offer

the appropriate software in the server bundle). Like Sun's Netra Internet Server, Digital's Electronic Locker module should relieve you of worry about keeping the system available, thus letting you focus on building content.

Compared with the other Unix solutions we reviewed, the AlphaServer 1000 stands midway between very little need to interact with Unix (Sun's Netra Internet Server) and complete dependence on your ability to interact with Unix (SGI's WebForce INDY). As long as you are willing and able to invest moderate resources in Unix systems administration, which, thanks to the Electronic Locker, almost anyone in your office should be able to do—this solution offers you a great performance base on which to build a reliable presence on the Web.

Sun Microsystems Computer Co.

Netra Internet Server

BY SEAN GONZÁLEZ



The Sun Microsystems Netra Internet Server (\$15,495 as reviewed) is an impressive and highly versatile Internet server. The Netra runs a slew of Internet services including the Netscape Communications Server, telnetx, FTP, and anonymous FTP (a primary/secondary/caching DNS server), and a bunch of e-mail services as well: POP2, POP3, IMAP, and Sendmail v8 mail servers. Soon, Sun expects to offer IPX gateway functionality to provide your Novell network hosts access to the Internet without requiring a TCP/IP stack in every PC.

Setting up the system is easy: just attach the six cables included and power up. The system gives you simulated voice notification when the system starts and ends its boot-up sequence, a nice, user-friendly touch.

To configure the system you simply log on to a special setup account. Upon log-on the Netscape Navigator browser comes up and requires you to authenticate yourself as the server ad-

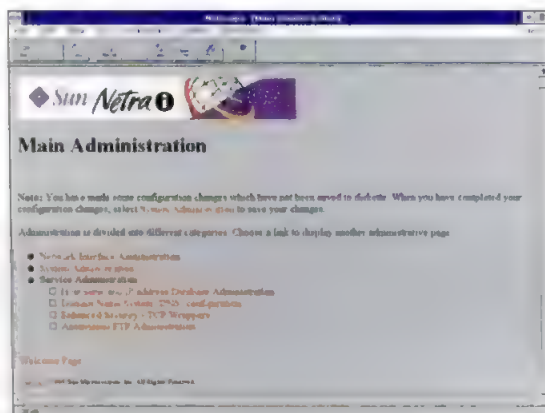
ministrator; you then see the Netra configuration welcome screen.

EASY CHOICES

You can choose between two configuration methods: the easy one and the easier one. The super-easy method uses a disk—supplied by your VAR—containing all the system-configuration information required to make the server a valid system in your network. Aside from simplicity, the advantage of this capability is that, should you ever have to rebuild your system from scratch, all you have to do is boot off the vendor-supplied CD-ROM, restore your configuration disk, and possibly restore your content if it was destroyed as well. The process should take no more than an hour.

In the merely easy configuration option, HTML forms guide you step-by-step through the system process, using an interface very similar to that used by the Netscape Communications Server. Your network administrator should be able to give you all the information necessary to configure your Netra server (that is, host name, IP address, network mask, default router, and whether the Netra server will be a primary/secondary/caching DNS server).

The configuration panels would benefit from more on-line help. Although the information required is fairly straightforward, in some cases the syntax required for supplying this information could vary; and the forms don't always make it clear how to proceed.



From the Netra Internet Server main menu, you can access all system management panels, including user accounts and system start-up and shutdown.

FACT FILE

Netra Internet Server

List price: \$15,495 (includes Sun Solaris 2.4 operating system, 75-MHz SuperSPARC II processor—second CPU optional—32MB RAM, 2GB hard disk space, Netscape Communications Server 1.1. Color monitor: 17-inch, \$2,000. **In short:** The Netra Internet Server is a powerful multiprocessor system. It offers not just a Web server but a very complete Internet services solution right out of the box. Coupled with its enhanced security features, the Netra server interface makes server management almost trivial, which lets you focus on building your presence on the Internet rather than on keeping a system up and running, unfortunately, you will have to figure out how to do that on your own. And because Sun systems are so popular among developers of Internet technologies and applications, this solution is likely to give you the greatest compatibility and growth potential. Sun Microsystems Computer Inc., 2550 Garcia Ave., Mountain View, CA 94043-1100, 800-786-0404, 415-960-1300, fax, 415-856-2114; <http://www.sun.com>

481 on reader service card

HOW MAY WE SERVE YOU?

The Netra server comes preconfigured with the NCSA Web server software. To install and configure the optional Netscape Communications Server (as we did), you'll have to execute some Unix commands, which you'll find in an addendum sheet. We found a few errors in the addendum, which we relayed to the vendor for correction; but once we ironed out the details we were able to install the Netscape Communications Server in no time. (Note that Sun assumes that your VAR will help you remove the NCSA Web server and install the Netscape product.)

A very valuable resource included with the Netra Internet Server is a copy of O'Reilly & Associates' *Managing Internet Information Services*. This book gives detailed information about the protocols and programs running on your system; and it explains how to add new functionality should you need it down the road.

Security was clearly on Sun's mind when it designed the Netra package. Sun's enhanced security is based on the TCP-Wrappers, a utility widely used on the Internet that allows you to restrict access to system services by attempting to validate the requesting host's identity through DNS information. Configuring the utility is very simple, but Sun uses the simpler configuration of the TCP-Wrappers, which may or may not be flexible enough

to work in your environment. For example, although the TCP-Wrappers can be set to restrict access to all hosts in a subnet or a specific domain name, Sun's implementation lets you select only from all, none, or local.

Despite Sun's attention to security in some areas, we ran into some shockingly bad security practices in others. Managing users is very simple through the Netra configuration panels, but the account-setup screens suggest that if a user doesn't want a password, you should leave the password entry blank. This is bad advice on an Internet-accessible system, and you should avoid doing it at all cost, as it greatly increases the possibility of system break-ins. Further, while the Netra includes both POP2 and POP3 software, it sets up POP2 by default. POP2 is considered a security risk these days, however, and should not be used unless there's no alternative. Although we applaud Sun's eagerness to provide as much functionality as possible, we feel that the best way to handle secondary services is to have them disabled by default, giving the administrator the option to enable them as wanted or needed.

FTP, ET CETERA

If as part of your Web strategy you want to provide access to a file archive via FTP, it is trivial to configure the Netra to enable anonymous FTP services. Note that this is a task that can be very laborious; and often people misconfigure the FTP server, which leads to interruption of service or security holes.

A word of caution with the FTP server, though: If you expect high FTP traffic (several tens of thousands of connects per day), consider moving your FTP server to another machine. FTP servers tend to surface problems with either the FTP server code itself or the system TCP/IP stack; and this can result in an unstable Web server.

Of the systems we reviewed, the Netra is the only one that will allow you to add a second CPU, which will come in handy, especially if you expect to run queries for searchable content. In conjunction with the multithreading capabilities of the Netscape server software, the second

CPU option will give you enhanced performance that can get you well past the medium load requirement (250,000 connects per day) of our Web server challenge.

The Sun Netra Internet Server is a powerful, highly functional, and easy-to-manage Web-server system. Although Sun includes no tools to help you build or manage Web content, by making sure you have a reliable and powerful system to deliver your content to the Internet, the solution largely frees you to focus your energies on those tasks.

Silicon Graphics Inc.

WebForce INDY

BY SEAN GONZÁLEZ

Silicon Graphics' (SGI) WebForce INDY (\$10,995) is a Web author's dream machine. It has all the bells and whistles only SGI could conceive, making it quite possibly the best authoring solution available. As a Web server, it has I/O enhancements that distinguish it as a decidedly high-performance solution. Don't expect a system that's easy to configure, however; you'll need some Unix expertise to get this baby up and running. And if you have to work with Silicon Graphics directly, you may have to endure a bit of frustration, as its technical-support staff was not very responsive during our testing activities.

The INDY server has every built-in



The WebMagic form builder, like all other WebMagic features, allows you to create forms with GUI tools. You need not know a single HTML tag to build your HTML forms.

▶ FACT FILE

WebForce INDY

List price: \$10,995 (includes SGI IRIX operating system, 133-MHz MIPS R4600 processor, 32MB RAM, 1GB hard disk space, Netscape Communications Server 1.1, 17-inch color monitor, WebForce authoring software suite) **In short:** The WebForce INDY can best be described as the ultimate authoring workstation. Because it is such a high-powered system, it can also serve as a powerful Web server; but its main strengths lie in its WYSIWYG authoring environment, which exploits drag-and-drop capabilities to make HTML authoring a graphical process devoid of cumbersome HTML tagging. Setting up the system will take some patience and Unix expertise, but once set up, the Indy's graphical desktop is so easy to use it can even make Unix systems management a pleasure.

Silicon Graphics Inc., 2011 N. Shoreline Blvd., Mountain View, CA 94043, 800-800-7441, 415-960-1980, fax, 415-390-6320; <http://www.sgi.com>.

482 on reader service card

I/O connection imaginable. You can attach earphones; a microphone; audio, line, or digital input and output; analog composite video; s-video; Ethernet (both 10Base-T and AUI); ISDN; two serial devices; and the IndyCam color video camera—all without an iota of additional hardware. With all of these feature connectors, the INDY redefines what a multimedia system should be.

EZ IS AS EASY DOES

Once you're done figuring out which cable goes to which connector, you power up the system to arrive at a log-on screen containing icons for each user account on the system. The EZsetup icon helps you configure the workstation as a node in your network. Its configuration screens help you set the system name, administrator's account, IP address, and network mask; they also help enable or disable NIS and NFS services. So much for easy setup; the rest is mostly up to you to figure out.

Two other log-on icons, the Web Seminar and the Web Workshop icons, are your tickets to a guided tour of the system's capabilities and how to use them. Together with these special demo/instructional log-ons, the INDY's on-line documentation is extensive and quite complete.

To set up the Web server you will have to follow step-by-step instructions outlined in one of the on-line documents. Unlike the other solutions we review

here, SGI's WebForce INDY requires you to begin by executing Unix commands at the system prompt. Once the installation process is under way, however, you'll be working with the same Netscape configuration screens found in the other solutions we reviewed.

BRUSH UP ON UNIX

To perform such system management tasks as backup, start-up and shutdown, user-account management, and software installation and configuration, you'll need to use Unix commands or learn how to use the SGI desktop and graphical Unix environment. Although the system includes a tutorial to guide you through the steps, there's no simple road map to get you up and running quickly.

Like every other system-management aspect of the INDY, security is more or less left up to you to figure out. Before you connect your INDY server to the Internet, you'll want to be sure that—with or without the help of your VAR—you've secured against unauthorized entry and tampering. And by the way, watch out for services such as NFS, which SGI has made easy to enable. While NFS may be a useful service, it's considered a high-risk protocol in Internet-accessible systems and should be avoided if possible.

AUTHOR AIDS

As with any other Unix system, you can add software to your INDY server to make it a comprehensive Internet services system. But the power of the INDY is best put to use by its authoring software. This collection includes the WebMagic Author and Digital Media Tools suite and Adobe Photoshop and Illustrator.

WebMagic Author is a WYSIWYG Web authoring tool that allows you to build multimedia HTML documents without keying a single HTML tag. To insert a graphic into your HTML document, for example, you drag-and-drop it from your graphics program into the page. To create a hyperlink, you highlight the link text or image and click a button to enter the link's

URL. The philosophy of the interface is to let you to focus on how your pages look without having to concentrate or waste effort on coding HTML tags to get the desired effect. The current version of WebMagic Author supports HTML 2.0 only, so with it, you won't be able to use Netscape's HTML extensions. The upcoming version of WebMagic Author, however (which should be out by the time you read this), is slated to support the Netscape extensions.

THE FANCY STUFF

The second component of the software suite, the WebMagic Digital Media Tools, is a collection of tools for creating and manipulating image, video, and audio files. The SoundEditor enables mixing, editing, and overdubbing of tracks; and it can export files to a number of industry-standard file formats.

The MovieMaster converts SGI and QuickTime movies to either MPEG-1 or CinePak files. Image-

works allows you to enhance and manipulate images. And MovieConvert lets you convert from a number of industry-standard image formats to movie file formats and vice versa.

For creating or enhancing conventional images, you can't go wrong with two of the industry's leading packages, Adobe's Photoshop and Illustrator.

IN SUM

The INDY is an enviable Web authoring platform that's bound to cause some arguments amongst your peers as to who gets to use it next. As a high-end graphics-handling system, its enhanced I/O capabilities make it an outstanding Web-authoring environment and Web-server performer. But the product lacks intuitive system management tools and procedures to help you avoid having to figure out these tasks on your own. Once you know what to do, the tools are easy to use; but SGI could do a better job of providing a road map that would save your valuable time in figuring out and learning how to use the system. □

*WebForce INDY is an
enviable Web authoring
platform that's bound to
cause some arguments
about who's next in line
to use it.*

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MULTIUSER ACCOUNTING



The trickle that began two years ago is now a flood: LAN-based Windows accounting systems are here in force. How do they add up? We test eight contenders.

The Bottom Line on WINDOWS

By Ted Stevenson and Thomas White

It's been a tantalizing wait: Two years ago, we reviewed the first Windows-based multiuser accounting products to hit the market, predicting that with this breakthrough, Windows implementations would begin flooding the market. We were right on one count: Every major vendor in this segment of the accounting market now has a Windows product line. On the other hand, the transition has taken considerably longer than

we anticipated, and it isn't yet complete. So far, few vendors have managed to bring a full suite of Windows-based accounting modules to market. The highest common denominator we could find for this review was the basic

IN THIS REVIEW

Products reviewed:	
Accounting Vision/32.....	278
Dynamics LAN 2.1.....	280
Impact Encore 1.0.....	283
Progression Series, Version 7.0,	
WindowsPlus Solutions.....	288
Pro Series 3.01i.....	294
Scala for Windows 3.1.5.....	300
Solomon IV for Windows.....	302
Traverse Accounting Business Software	
for Windows 2.....	303
Late Out of the Gate.....	290

triumvirate of general ledger (GL), accounts payable (AP), and accounts receivable (AR).

Why so slow? The move to Windows has proved to be a monumental development effort for vendors. These are big, complex products, in many cases fully redesigned along radically new lines—and they *have* to work as advertised. Accounting customers are notoriously intolerant of software problems. Hence, developers' dollar investments have been huge, and testing has been more extensive and time-consuming than most vendors anticipated.

Nevertheless, Windows is clearly the name of the multiuser accounting game today, with research and development on character-based versions sloping off to near zero.

Windows confers many advantages, of course, but one—event-driven programming—is of particular importance in a fundamentally nonlinear process like accounting. Unlike older modal programs, where navigation is strictly through inflexible menu systems—backing out of one operation before moving into the next—event-driven programs let us move freely among activities as need dictates. For any but the most repetitive tasks, it's a far more efficient way to work. Event-driven programming is further enhanced by Windows' multiple document interface (MDI), which lets users keep several active

Dynamics LAN, Version 2.1 Solomon IV for Windows

Windows-based multiuser accounting has finally arrived, and it seems to be here to stay. No longer novelties, Windows products meet or exceed the accounting functionality of their DOS predecessors,

while offering greater ease of use and vastly improved integration and customization features. Innovative companies will capitalize on the latter, tailoring their software better than ever to organization-specific needs and procedures, and integrating them with third-party workgroup tools.

Of the eight Windows solu-

tions we reviewed, two stand clearly above the rest: Great Plains Software's Dynamics LAN and Solomon Software's Solomon IV for Windows. Although the products are different in many ways, they're alike in being designed from the ground up as Windows programs.

Dynamics LAN has the best user interface of the group,



processes open on the desktop at once, moving and transferring data freely among them.

SHARE AND SHARE ALIKE

Data sharing, in turn, is an important aspect of the other key Windows benefit, integration—across accounting modules, even totally separate applications. At the most basic level, the Windows clipboard lets you move data from one program window to another, whether it's from one screen of an accounting package to another,

or between the accounting software and a Windows word processor, spreadsheet, or e-mail program. With dynamic data exchange (DDE) or object linking and embedding (OLE), data transfers can be automated, and the synergy between various software tools grows enormously. Few accounting packages, for example, have charting capabilities, but every up-to-date Windows spreadsheet does, so with easy data transfer, accounting software users gain sophisticated financial charting and graphing.

HIGHLIGHTS

Multiuser Accounting

SUDDENLY, it's an all-Windows game. Today, every major vendor of multiuser accounting software has at least a partial suite of Windows-based modules on the market. They're a varied group, but look for consistently easier learning, more intuitive interfaces, and more logical operation.

YOU'LL NEED HEAVIER hardware to run these packages than for their DOS predecessors. Depending on the package, workstations may be as modest as a 486/50 with 8MB of RAM or may call for a 486/66 with

20MB of RAM. Power users will want Pentiums for most of these systems.

MORE AND BETTER customization is one of the major benefits of the move to Windows. Among the packages we review here, you'll find every capability from quick moving and retitling of data entry fields to building fully customized subapplications using vendor-supplied programming or scripting languages.

INTEGRATION of accounting data with third-party workgroup productivity tools like Lotus Notes is a key

emerging feature with some of today's advanced multiuser systems.

HIGH-TECH WIZARDRY such as image and sound attachments are cutting-edge technologies that are beginning to find their way into some Windows accounting packages.

SOME SYSTEMS OFFER a dual interface option, with which selected users run Windows modules while others use DOS versions—and both access the same database. This lets companies leverage their existing hardware to maximum advantage.

strong accounting features, and intuitive and powerful drill-down inquiry. Dynamics LAN supports Macintosh, Windows, and Windows NT platforms and, as one of the two 32-bit applications in this roundup, should be well positioned to take advantage of Windows 95. Finally, Dynamics LAN's Integration Manager lets companies link their accounting systems with Lotus Notes and other productivity tools.

Solomon IV for Windows upholds Solomon Software's tradition of strong financial applications, enhancing it in this release with outstanding customization capabilities. While most of the packages we looked at have some customization capabilities, Solomon IV's are more flexible, comprehensive, and straightforward, particularly for those

familiar with Visual Basic.

Solomon's decision to use R&R Report Writer for all its standard reports and forms allows companies that purchase the third-party tool to modify Solomon IV's reports and forms—or create new ones.

We give honorable mention to Macola Software's WindowsPlus. Best known in the past for its distribution and manufacturing applications, Macola has strengthened the financial applications in the new product by adding a Bank Book module, to improve cash management, and Currency Manager, to address multicurrency needs. Once again, Macola did very well on our performance tests, and its customization module, Designer, is one of the better tools we reviewed.

In fact, Windows programs lend themselves to many kinds of customization, from the repositioning and renaming of fields on data entry screens to the whole look and feel of the application: from changes that adapt to the needs of an individual user to administrator-designed changes that roll through to entire departments. Windows not only enables a wider range of customization (even using generic programming tools like Visual Basic or Delphi), but in many instances, changes can be carried out by nonprogrammers.

THE PLAYERS

For this review, we once again teamed up with Price Waterhouse to monitor the state of the art: We've rounded up all the currently shipping file-server-based Windows products (general ledger, accounts-payable, and accounts-receivable modules only) from vendors with a strong presence in the marketplace (which means a track record and a well-established network of resellers and consultants): a total of eight well-known companies.

Forthcoming products from two more vendors—CYMA and Platinum—didn't ship in time to receive full reviews here. We preview them in the sidebar "Late Out of the Gate."

Several of the products we review offer

some client/server capabilities, such as Solomon IV for Windows with its implementation of BTI's Scalable SQL. Yet none makes full use of the kinds of key client/server database features, such as triggers and stored procedures, found in databases like Oracle, Sybase, SQL Server, or the forthcoming Version 4 of Scaleable SQL.

NEW LOOK OR NEW PERSONALITY?

The products in this evaluation break down roughly into two groups: new, built-from-the-ground-up Windows packages (Great Plains' Dynamics LAN, Intellisoft's Accounting Vision/32, Open Systems' Traverse, and Solomon Software's Solomon IV for Windows) and established packages with new Windows interfaces (SBT's Pro Series, Scala USA's

Intellisoft's Accounting Vision/32, the first multiuser Windows accounting package and an Editor's Choice in our last review, remains a worthy competitor but has seen others surpass its lead. Syspro's Impact Encore provides a pleasant interface, very strong inquiry capabilities, and solid accounting features. SBT's Pro Series did very well on our performance tests and, with its solid accounting features, should be considered by any company looking for a FoxPro-based, source-code-modifiable solution. Scala for Windows offers unrivaled multicurrency features and a full suite of accounting and manufacturing modules. Written in Microsoft Access, Open Systems' Traverse is highly customizable and integrates well with other Office applications.

Scala for Windows, and Syspro's Impact Encore).

Those that take the just-add-Windows approach don't take as much advantage of Windows technology as the newly designed programs (MDI capabilities being in important case in point), but they do offer some potential compensations. For example, SBT, Scala, and Syspro (mentioned above) all let you mix DOS and Windows versions on the same network, accessing the same database. This lets companies leverage their PC hardware investments to the maximum while taking advantage of the new Windows capabilities for selected workers. Another benefit of this dual-interface approach is the ability to make a gradual transition to the new environment with minimal retraining.

Our Contributors: This evaluation is a result of collaboration between *PC Magazine* and a team of accounting experts from Price Waterhouse. Team leader THOMAS WHITE, is a partner with Systems Advisory Services, a California-based consulting firm specializing in the implementation of accounting systems. The Price Waterhouse project leader was LUCIANO MEROCCHI, a manager in Mississauga. RICHARD C. BORLASE, WESLEY HOWARD III, and ED KNEITEL are senior managers at Price Waterhouse locations in the U.S. and Canada. COLLETTE CLELLAND, STEPHEN HERLICK, ROBERT MACWHIRTER, MURTAZA MOHAMED-TAKI, DAVID RICHARDS, and SANDRA SAPONARA are Price Waterhouse managers. MAUREEN G. DANCY and LAUREEN ROMANIUK are senior consultants at Price Waterhouse. TED STEVENSON was the associate editor in charge of this story, and THOMAS R. WHELAN—project partner in Price Waterhouse's office in Mississauga, Canada—coordinated the project.

Multiuser Accounting

The other side of this coin is that the basic thinking reflected in such products is rooted in DOS programming methodology, thus missing much of what's attractive and efficient about Windows. Assuming that such companies eventually move all the way to a product that does fully exploit Windows (or a successor technology), they're likely to find that they've just deferred some painful transitions.

FEATURES VS. FLEXIBILITY

As long and winding as the road to Windows accounting has been, the progress has definitely been worth it. In the DOS era, accounting vendors waged features wars; now, in the Windows age, they're concentrating more on flexibility, and providing tools for customization and integration. Every package in this review has at least some facilities for easily customizing data entry screens, menus, and reports; many go much further, providing system-wide configuration tools and even full-blown

scripting or programming languages. Most of these customization tools don't modify source code; therefore, changes don't get overwritten when you install a new version of the software.

Application integration is another long-term key to the importance of Windows-based accounting. An illustration that goes beyond the spreadsheet charting example that we touched on earlier is reporting, which was once considered a basic accounting-software function but is now emerging as too important to be left to

the accounting package. All these packages include traditional reporting capabilities, but they rely increasingly on third-party report writers for their main-line reporting capabilities. For the customer, this means better, more flexible reporting; for the accounting vendor, this means an easier job, because it doesn't have to build the entire report-writing application.

In a Windows-based world, accounting data can be easily integrated with a vari-

ety of tools for information flow (such as e-mail, discussion databases, and workflow automation systems). This improves overall information flow with less effort and boosts the entire organization's efficiency. With Accounting Vision/32's ability to print to e-mail, for example, sales reports can be sent to regional sales offices electronically, saving time and paper.

The popularity of workflow tools and the drive to reengineer inefficient processes has many companies looking for ways improve integration of their accounting software with their many information flows. Lotus Notes—integration tools available for Great Plains and Solomon allow workflow/routing applications, such as purchase-order requisition and expense-report processing, to link to the accounting software, speed up the flow of information, and prevent substantial rekeying.

MULTIMEDIA ACCOUNTING

Advanced Windows-based techniques like attaching images (scanned invoices, orders, or memos, for example) to data records are beginning to appear in accounting products like Impact Encore. In fact, Impact Encore users can even attach sound annotations and video clips. Func-

In a Windows-based world, accounting data can be easily integrated with information-flow tools.



MULTIUSER ACCOUNTING

Suitability to Task

For the **financial accounting** category, we looked at the features and functionality found in the G/L, A/P, and A/R modules. For each package, we evaluated more than 200 features, such as a chart of account flexibility, budgeting, allocations, on-line inquiry, history retention, payment selection, bank reconciliation, billing, and cash receipts. We also looked for high-end features such as multicurrency, consolidations, and multicompany processing.

Given the importance of **reporting**, we decided to evaluate this area separately. Four types of reporting were considered: standard reports, financial reports, system-wide report writers, and on-line inquiries. We examined the capabilities and flexibility of each.

We chose four categories in which to evaluate the eight accounting software products. We did not assign weights to each category or assume one was more important than another—that depends on each business's particular needs and circumstance. We also evaluated ease of use, considering the facility with which users could conduct each task, along with the effectiveness of the graphical interface, on-line help, user documentation, and vendor support.

Finding an integrated accounting system that will meet all a business's needs exactly is virtually impossible. What most businesses hope for is an 80 to 90 percent fit. The ability to be tailored to meet or exceed that percentage is what we considered for this category. **Customization** can include the ability to tailor a system via setup screens, programming-related alterations, third-party enhancements, or source-code modifications.

Auditing and securing your data considers the manner in which these systems protect your valuable data and maintain the data's integrity. We looked at the completeness of the audit trail, system security, and fault tolerance. In addition, we put each package through in-depth performance tests.

SUITABILITY TO TASK		
	Power	Ease
Financial Accounting	Poor	Poor
Customization	Fair	Fair
Reporting	Good	Good
Auditing and securing data	Excellent	Excellent

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tionality like OLE that has become standard in up-to-date Windows desktop applications—though only partially exploited in these packages so far—will have a wide range of applications in accounting systems, as will more specialized data links like Notes/FX.

Accounting applications soon will be communicating with the world at large over the Internet. SBT Accounting already has launched its WebTrader module, which allows a World-Wide Web server to act as an order-collection point and provide other direct links between customers and a company's accounting system. The possibilities are largely unimagined, let alone untapped.

Although features haven't been the main focus of this first generation of Windows accounting systems, slow but steady progress has been made in this area. Multicurrency processing, for example, which was an exotic high-end feature two years ago, is available in one form or another in most of today's packages. Products are adapting more to the needs of large, multi-departmental companies by providing heftier, more flexibly structured GL account numbers (which also facilitates multicompany consolidations, of course). The ability to drill down from a GL account balance all the way to the originating source documents in the subledgers is becoming commonplace. And keep in mind that the increased customizability that goes with the Windows territory substitutes, to a large extent, for vendor-supplied feature innovations. In many cases, customers can create the features they need.

THE PRICE OF PROGRESS

For the short term at least, one result of the shift to Windows will be increased cost to customers. First of all, the products themselves are generally more expensive than their character-based predecessors. Some, like Dynamics LAN, have increased module prices as much as 25 percent. Others, like Impact Encore and Solomon IV, are pricing on a per-user basis that can bump prices to \$5,000 or more per module for larger companies. You'll also need to figure in costs for customization tools and report writers.

Then there's the cost of the hardware necessary to run them adequately (not a new issue in corporate desktop computing

or in any way unique to accounting). These packages really require fast 486s or Pentiums for snappy performance, in some cases with a minimum of 16MB of system memory. These facts are reflected in our testing configuration. Our performance tests pounded on these systems in the areas of reporting, posting, and data entry. Of course, the new interfaces had the greatest impact on the data entry tests, yet with the exception of Open Systems' Traverse, we saw better-than-expected times. See "Benchmark Tests" for complete testing details.

LOOKING AHEAD

What options lie beyond this first generation of Windows accounting systems? One of them is the new generation of Windows itself: Although Windows 95 wasn't released by press time (and consequently couldn't be tested), these packages should run fine under it (as most Windows 3.x products do). The Great Plains and Intellisoft products are 32-bit applications that may be able to take specific advantage of the new OS's capabilities.

Novell's NetWare always has been the network OS of choice to run accounting software. But with BTI's release of Btrieve for NT, most of these vendors can offer a Windows NT solution with little effort.

Also on the Windows NT front, many of the vendors have announced SQL Server versions of their software geared to the needs of larger organizations. With SQL Server and Windows NT, vendors now can offer true client/server applications, using a powerful relational database that can run on Intel or RISC platforms. Great Plains, Open Systems, and Solomon have announced SQL Server products.

Along with the move to new platforms, the trend in the corporate accounting-software market is clearly toward higher levels of cost and complexity. While customers may look forward with some trepidation to the coming transitions, there's no question that they'll be buying better business solutions. Read the reviews that follow and chart your path to the future.

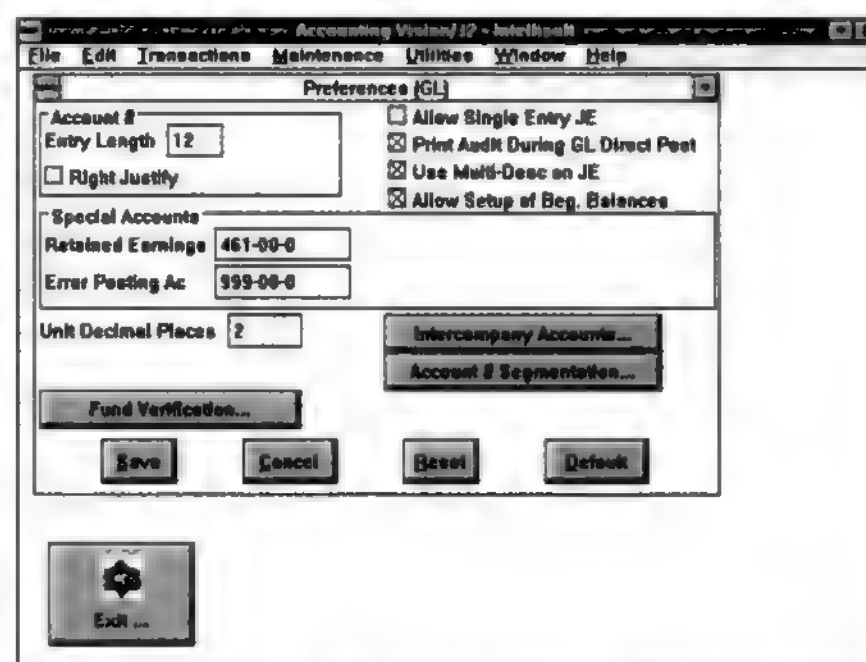
Intellisoft Inc.

Accounting Vision/32

BY RICHARD C. BORLASE AND
LAUREEN ROMANIUK

Intellisoft's Accounting Vision/32, as the first high-end Windows accounting product ever reviewed in a *PC Magazine* accounting evaluation, drew compliments for its clean user interface and many unique accounting features. Compared with the other, newer Windows accounting systems, AV/32 may no longer look quite so shiny, but Version 3.5 remains a worthy competitor in this increasingly crowded field.

Originally developed for the 32-bit OS/2 platform and written in C++, AV/32 is well positioned to take full advantage of Windows 95 and Windows NT. Its peppy



Accounting Vision/32's powerful general ledger includes the ability to process intercompany accounts and fund verification as indicated on this setup screen.

navigation through the system is even more impressive when you realize it requires less memory (4MB minimum) than most of the other products in this roundup.

THE DEVIL IS IN THE DETAILS

AV/32's GL provides numerous useful features. For those who require excruciating detail, AV/32 can support account numbers up to 50 digits long. Fortunately, you can set up account aliases to minimize keystrokes. You also can restrict users from posting to specific account segments and even restrict posting to a specific account if you have exceeded its budget.

Companies with foreign operations can consolidate multiple subsidiaries with different currencies and conversion rates and with different charts of accounts. But AV/32 does not support multicurrency transactions

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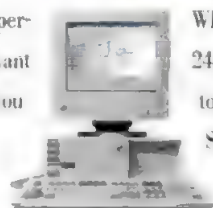
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Multiuser Accounting

and is not FASB 52-compliant. According to Intellisoft, an International Currency module is forthcoming; it should be available by the time you read this.

If you require a system with strong inquiry capabilities, you'll be disappointed with AV/32. The package has a few predefined transaction-query screens but won't let you dynamically drill down to successive levels of detail. Therefore, you're relegated to the time-consuming task of printing reports on-screen to locate the information you require.

THE ADDED BONUSES

AV/32's AR and AP modules do a good job of meeting standard business requirements. A feature that particularly stands out is the ability to flag invoice line items, rather than the entire invoice, for 1099 processing. Alternate keys can be set up for vendors and customers to ease data access. The AR module offers a Schedule Payments option for financed sales; it will track both sales and interest revenue for time payments by customers.

This product has very little batch-processing control. In fact, it truly lends itself to use by empowered end users who enter their own transactions as they occur and run postings and reports on demand. This

decentralized approach is one of the product's most unique characteristics.

Intellisoft offers several modules to support the basic GL, AP, and AR modules reviewed here, including Data Manager, Fund Accounting, Purchase Order, Point of Sale, Inventory Management, Sales Order, and Payroll. When implemented, they're tightly integrated and contribute to a well-rounded accounting product suite. And all business forms, such as checks and statements, can be modified to meet your unique formatting requirements.

HAVE THAT REPORT ON MY DESK

AV/32's report writer is quite functional, but you'll need some programming skills and training to master fully the power of this tool. Virtually any AV/32 data (summary or detail) can be accessed with the report writer, and reports can be printed to screen, printer, file, or any MHS-compliant e-mail address. Unfortunately, the report writer can't produce boardroom-quality reports that include multiple fonts and other word processing-like formatting.

Where the report writer let us down, Intellisoft's Data Manager module compensated by letting us easily use DDE to link to various Windows products (Microsoft Excel, Lotus 1-2-3, Maximizer, and Quattro Pro) for high-quality output of reports, charts, graphs, and other documents. For users who are converting from other systems, the data manager provides DDE support for importing data, and Intellisoft provides an on-line checklist of the necessary steps.

TAMING THE VERTICAL

AV/32's Vertical Market Toolkit (included with the System Manager module) is a handy tool to customize users' desktops, on-line help, data entry screens, reports, and forms. While adding new data elements by users is prohibited (thereby maintaining the consistency and integrity of the database through future releases), any existing field may be moved or hidden from view. You can make the screens as complex or as simple as you wish without having to worry about displaying programming expertise, and your changes won't be overwritten by subsequent releases of the software.

A timesaving feature expected in the next release is the ability to customize

screens for a group of users, instead of having to make changes for each individual. If you require more complex customizations, you can create data entry screens or add-on modules with development tools like Visual Basic and access them via AV/32 menus.

AV/32's hard-copy and on-line documentation is disappointing; it's as much as four years out of date in some places and hasn't kept pace with the product's development. As a result, many powerful features aren't documented anywhere in the product. This presents an absolute need for training or experienced support for implementation.

If you require local customization, along with any of the unique accounting features of AV/32, and drill-down queries aren't critical to your needs, this product is worth your consideration. The implementation may be challenging, however, given its many features and limited documentation.

Great Plains Software

Dynamics LAN

BY LUCIANO MEROCCHI AND
MAUREEN G. DANCY



An innovative product that truly takes advantage of Windows technology, Dynamics LAN, Version 2.1, from Great Plains Software, is built from the ground up with its own toolset, Dexterity, a rich C-

like development environment. This 32-bit application has a wonderful user interface for Windows or Macintosh clients, an excellent query facility, a strong feature set, and tight integration with Lotus Notes and other important business tools. Performance has improved vastly since Version 1, but Dynamics LAN still requires a powerful PC for acceptable speed.

As for installation, the Dynamics LAN routine can be daunting, especially for the novice. In addition, some maintenance operations, such as setting up new companies, are significantly more complex than for others in this review. Relying on a reseller or consultant is recommended.

If you like graphical interfaces, you'll immediately warm up to the Dynamics LAN look and feel. Not only will you find

▶ FACT FILE

Accounting Vision/32

List price (2 to 5 users): Accounts Payable module, \$1,495; Accounts Receivable module (and Financial Report writer), \$1,495; General Ledger module, \$1,495. **System Manager module, \$1,495. Requires:** Server: LANtastic, LAN Manager, NetBIOS, NetWare, Microsoft Windows NT, Windows for Workgroups. Workstation: 386 processor, 4MB RAM, Windows 3.1. **In short:** This pioneer of Windows accounting has lost some ground to its new competitors but still offers some unique accounting features and an easy-to-use customization tool. Outdated manuals and on-line help make Accounting Vision/32 more challenging to implement.

Intellisoft Inc., 2114 W. Mayfield St., Arlington, TX 76015; 800-933-4889, 817-467-7243; fax, 817-467-7133

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SUITABILITY TO TASK

	Power	Ease
Financial accounting	Good	Good
Customization	Good	Excellent
Reporting	Good	Fair
Auditing and securing data	Good	Good

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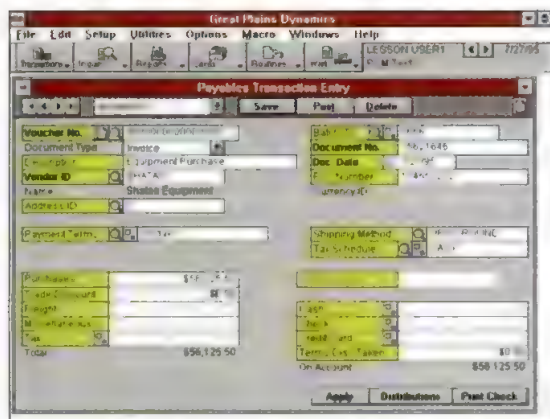
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Multiuser Accounting



As with all of Dynamics LAN's data entry screens, the Payables Entry screen is loaded with lookup fields signified by the magnifying glasses.

standard Windows capabilities, such as MDI, screen resizing, and so forth, but Great Plains has added several other timesaving features. You can place menus anywhere on a desktop and hold them in place with "pushpin" buttons, which also let you keep lookup windows open for quick reference.

Other helpful icons are found in the data entry screens, including a magnifying glass to signify that a lookup list is available; a note icon to signify that you can attach notes to a field, record, or screen; and an expansion icon to let you add or modify detail associated with that field.

One of Dynamics LAN's most impressive characteristics is the ease with which you can access key business information. Fast drill-down to source documents and attached notes should satisfy the most demanding users. Those with appropriate security can easily reach information from anywhere in the system.

GOING BY THE NUMBERS

Dynamics LAN's GL account numbers top out at 20 characters with a maximum of ten segments. Each fiscal year may have as many as 54 user-defined fiscal periods. You can flag a period by module as open or closed for posting, and you can change that status from closed to open to accept a late adjustment or invoice; the resulting change will flow through the system.

Notably absent in the GL is the ability to perform consolidations or inter-company processing, both of which are slated to be in a future release.

This version of Dynamics handles

multiple currencies in the GL but not in the subledgers. Although the GL currency management is strong and can provide much of the information required by FASB 52, most multinational organizations will want to track currency fluctuations at the transaction level in their subledgers.

POSTING POTENTIAL

The numerous posting options in Dynamics LAN should meet the demands of both small and large businesses: Batch controls can be used for any data entry form in the system; you have the option

of posting by batch or by individual transaction at the time of entry. Posting can be in detail or summary, and you can post submodule transactions directly to the GL or to an unposted GL batch. You also can schedule a master posting that will post batches in all modules. Larger organizations will appreciate the ability to have multiple users post batches simultaneously in the same module without locking or concurrency problems.

Advanced Financial Analysis (AFA), a WYSIWYG report writer that produces

great presentation-quality financial statements without recourse to your spreadsheet, is bundled with the GL. AFA is not fast, though, particularly with large data sets, nor can it produce provisional financial statements. Therefore, Great Plains often recommends the third-party report writer FRx to address these deficiencies.

TAILOR-MADE

Dynamics LAN offers numerous facilities to tailor the software to meet particular business needs. You can add or remove items from palettes so they include the tasks that a user (or user group) does most frequently. Similarly, you can create a customized work button on the Dynamics LAN toolbar that includes all your daily tasks, such as launching external applications like word processors or spreadsheets.

If you need to change data entry forms, Dynamics Modifier (\$1,000) lets you do so without programming. This graphical tool allows changes like simple renaming or reordering of fields, all the way to creating entirely new forms.

THE BIGGER PICTURE

Today's businesses want to extend the boundaries of their accounting systems beyond the accounting department. To meet this demand, Great Plains has introduced the Integration Manager. It allows developers to integrate key business tools, such as Lotus Notes, FRx, and Watermark, tightly with Dynamics LAN. The Lotus Notes integration already has sparked third parties to develop applications such as expense-report processing, or sales-quote tracking systems that directly read and write Dynamics LAN data.

Because of performance enhancements in Version 2.1, Dynamics LAN managed to finish in the middle of the pack on most of our performance tests. It performs best when applications and data dictionaries are installed on the client PC, so you'll want a minimum configuration of 486/66 (a Pentium is recommended) with 16MB of RAM and 100MB of disk space.

Dynamics LAN is feature-rich, intuitive, and easy to use. Its ability to provide information at your fingertips is unrivaled for a product in this price range, and the integration with other applications, particularly Lotus Notes, is a big plus that should meet many varied business needs.

► FACT FILE

Dynamics LAN, Version 2.1

List price (4 users): Accounts Payable module, \$1,000, Accounts Receivable module, \$1,000; General Ledger module (and Advanced Financial Analysis), \$1,500, System Manager module, \$2,000. **Requires:** Server: Microsoft Windows NT, NetWare Workstation; 486/66 processor, 12MB RAM, 100MB hard disk space, Windows 3.1. **In short:** Dynamics LAN sports a wonderful interface and excellent inquiry capabilities. Controllers will appreciate the strong accounting features, multiple posting options, and ability to integrate with other applications, such as Lotus Notes. Don't skimp on hardware and consider using FRx to maximize performance.

Great Plains Software, 1701 SW 38th St., Fargo, ND 58103, 800-456-0025, 701-281-0550, fax, 701-281-3700

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SUITABILITY TO TASK

	Power	Ease
Financial accounting	Good	Excellent
Customization	Good	Good
Reporting	Excellent	Good
Auditing and securing data	Excellent	Good

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Syspro Impact Software

Impact Encore

BY DAVID RICHARDS

Syspro Impact Software—by coupling the sound underlying business logic of its character-based product, Award, with the more modern Windows interface—has come up with Impact Encore, Version 1.0. And along the way, Syspro has managed to maintain the strength of its software, while replacing an outdated user interface, bringing proven accounting functionality to the Windows world.

The Encore modules (currently, GL, AP, AR, Cash Book, and system manager) are available in both Windows and character-based versions. Both can be run on the same network, allowing businesses to migrate to Windows at their own pace.

Syspro plans to release Encore versions of its highly regarded distribution modules by the end of the year and the manufacturing modules by summer of 1996. If you need those modules before then, you can purchase the current Award modules and run them with the Encore financials.

THE WINDOWS ADVANTAGE

Navigating around the system is easy to grasp for both experienced and novice

Windows users. Encore's desktop includes the Windows standards—a pull-down menu bar and a toolbar displaying icons for each of the modules in the Encore suite. But what's really handy is that Encore displays icons for all key processes of the current module on the same screen. Therefore, you can easily jump to invoice entry, check payment, and other routine functions. Encore's Windows interface does have a couple of significant weaknesses, however: It doesn't support MDI, screen resizing, or DDE.

KEEPING ACCOUNTS

GL account formats are user-defined and can be up to 15 characters long. Each account record can be assigned two 15-character indices for financial-reporting purposes. Encore will support the tracking of multiple currencies within the GL and submodules, and the Cash Book module will report on currency gains and losses. FASB 52 consolidations are not supported.

Encore has plenty of journal-entry formats to cover any type of GL journal transaction. You'll find journals to handle intercompany postings, provisional entries for accruals, recurring entries, and adjustments; there's even a user-defined journal.

Up to nine budgets per fiscal year are allowed in Encore. A budget may be used to store statistical information such as units sold, pounds consumed, quantity produced, and so on, for comparative reporting.

MULTIPLE BRANCHES

A strong feature of both the AP and AR modules is that they are designed to support multiple branches or departments, in order to provide for distributed invoice entry and, in AP, for centralized check disbursement. For businesses that sell to different locations of the same large company, Encore allows you to invoice each location, while producing management reports that are grouped by the parent company.

Encore has some of the best inquiry features of the packages reviewed in this roundup. Its ability to drill down from summarized account balances to source is quite impressive. Controllers will love the ease with which you can go from account

balance to detail GL transactions to the original invoice in AP. Inquiries in the AR and AP modules are well-constructed and provide you with key business information, such as invoice history, supplier-re-



Syspro's Impact Encore presents a very graphical, easy-to-use desktop. Accounting processes are listed on the left and reports and setup routines are listed on the right.

ceipt history, rejects received by supplier, customer work in progress, customer-contract pricing details, and more.

SETTING THE STANDARD

Encore's standard reports provide numerous selection parameters so you can narrow your reports to include only the data you want. The Financial Report writer should meet most companies' financial reporting needs, but isn't as easy to use as some of the others we review. If you'd like to create your own reports outside the GL, you can use Impact Query (\$600) or purchase the ODBC drivers for Encore (\$2,600) and use industry-standard tools to access your data.

Other packages in this roundup provide toolsets for customizing, but Encore takes a less technical approach. It's a parameter-driven system, wherein changing one or more parameters will change how the system operates. For each module, parameters allow you to specify such options as a default browse field for customers, an invoice-aging method, charges to include in terms-discount calculation, and more. If these parameters are not sufficient, you can consider creating new screens with third-party tools like Dialog from MicroFocus.

FLEXIBLE FILE FORMATS

Encore supports many platforms and file formats. It runs on Novell NetWare, any

▶ FACT FILE

Impact Encore, Version 1.0

List price (2 to 4 users): Accounts Payable module, \$1,000, Accounts Receivable module, \$1,000, General Ledger (and Financial Report writer) \$1,000, System Manager module, \$1,000. **Requires:** Server: LANManager, LANtastic, NetBIOS, NetWare. Workstation: 386 processor, 8MB RAM, Windows 3.1. **In short:** Known for its comprehensive manufacturing software, Syspro's Impact Encore, Version 1.0, holds its own in this review of financial accounting modules. Its Windows interface could stand some improvements, but its overall features and on-line inquiry capabilities are very strong.

Syspro Impact Software, Five Hutton Center, #200, Santa Ana, CA 92707-5754, 800-369-8649, 714-437-1000, fax, 714-437-1407

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SUITABILITY TO TASK

	Power	Ease
Financial accounting	Good	Good
Customization	Good	Good
Reporting	Excellent	Good
Auditing and securing data	Good	Good

In testing Windows accounting software, we anticipated lackluster performance but were pleasantly surprised. Many accounting tasks aren't affected by a user interface, as most of the activity is at the database. The data entry tests showed that with the right hardware, most systems perform well.

What the Numbers Mean

There are similarities among the three top performers in this roundup: Pro Series, Scala for Windows, and WindowsPlus. Each vendor decided to maintain much of the existing source code and database technology from the character-based versions of its products and focus on providing an efficient if lackluster Windows interface. This approach makes for excellent speed, particularly for WindowsPlus, whose character-based software has been one of the best performers since we began performance testing in 1989.

The products that were total rewrites but had the most elaborate Windows interfaces didn't fare as well. Accounting Vision/32, Dynamics LAN, and Solomon IV for Windows finished in the middle of the pack, while Traverse finished near the bottom on most tests.

Pro Series did quite well, finishing second or third on most tests. Impact Encore struggled during the reporting tests but fared far better on the data entry and posting runs.

The testing approach was similar to that of previous years. We focused on the key accounting functions—reporting, posting, and data entry. We also used a test database similar to the one used in our 1993 testing, which consisted of the following: 6,489 GL accounts with 105,012 GL transactions; 3,000 vendors and 26,000 AP transactions; and 8,000 customers and 60,000 AR transactions.

Not surprisingly, these products require more powerful hardware than their DOS counterparts. To gain maximum performance, users will want to consider different factors. Dynamics LAN and Traverse, for example, will perform significantly better if most of the programs, work tables, and other temporary tables reside on the clients. Therefore, with these systems, client performance is key. Sometimes termed a *fat client*, your minimum configuration should be a 486DX2/66 processor with 12MB of RAM, but power users will want Pentiums with 16MB to 20MB of RAM.

For Solomon IV, server configuration is important. This *fat server* product should have a Pentium server with 16MB to 32MB of RAM beyond what is required by NetWare and your other applications to manage its Scalable SQL database environment effectively (a far cry from the 486DX/33 server with 16MB used in our 1993 roundup).

Solomon IV's SQL orientation looks to the server to be smarter about data access, returning only the data specified

and thereby reducing network traffic. This puts a bigger burden on the server, of course, and hence the requirement for increased server capacity. For most of the other products, standard Windows clients (minimum 486DX/50 with 8MB of RAM) and servers (minimum 486DX2/66 with 32MB of RAM) should suffice.

The **Standalone and Concurrent Reporting Degradation** tests consisted of printing five key reports, including a detailed AR customer aging, a customer list, a vendor list, a detailed GL trial balance, and a summary GL trial balance. For the Standalone Reporting test, we ran each report sequentially, while for the Concurrent Reporting Degradation test we ran all five reports together. We printed all reports to a test file.

Dynamics LAN, Pro Series, and WindowsPlus finished all reports in under 1 hour. WindowsPlus and Dynamics LAN completed the longest report, the detailed AR aging, in under 20 minutes—not bad when you consider that 60,000 AR transactions for 8,000 customers were reported.

Accounting Vision/32 took more than 3 hours, significantly laboring on the two longest reports, AR aging and detailed GL trial balance. Interestingly, Accounting Vision/32 uses the same record manager, Btrieve, as Dynamics LAN and WindowsPlus.

We conducted the Concurrent Reporting Degradation test to measure the amount of degradation incurred when all reports were run together. We weighted our results to account for the fact that the time to complete each report in the suite varies. The two fastest packages on the Standalone Reporting test (Dynamics LAN and WindowsPlus) fared worst on our Concurrent Reporting Degradation test.

You'll want to consider both standalone and concurrent times when evaluating overall performance. For example, WindowsPlus took twice as long to complete the summary trial balance on the concurrent test than on the standalone (the worst percentage of any vendor), yet it still had the third-best timing for that report.

For the **Data Entry** test, we simulated the input of five AP invoices with four lines of GL distribution each. We used Microsoft Test, computer-aided testing software for Windows applications, to enter the invoice data. We conducted tests on one, three, and six clients. We configured Microsoft Test to enter data as fast as the accounting software would accept it, thereby flooding the system with many more requests than one, three, or six users possibly could. Therefore, these tests simulate many more users than what we actually tested.

Unfortunately, because of incompatibilities between Microsoft Test and Impact Encore, Pro Series, and WindowsPlus, we were not able to automate these products without inserting artificial delays, which invalidates their test results. Therefore we did not include input times. Additionally, Traverse was unable to complete all the tests because of errors caused by contention problems.

Although we can't provide accurate numbers for Win-

Benchmark Tests: Multiuser Accounting Software

dowsPlus or Impact Encore, from our observation, they probably would have placed no farther back than the middle of the pack and, in fact, may have had some of the quickest times. If you're considering these products and are concerned with data entry speed, we recommend that you scrutinize data entry speed during your software demonstration and, for a real-life test, visit other customers running the software.

Accounting Vision/32 and Scala had the fastest data entry times, and degradation for both was minimal. Solomon IV's input times were good, but we noticed significant degradation as we increased the number of clients. Dynamics LAN's input times were slower than most but showed little degradation as the number of clients increased. The three Btrieve products, Accounting Vision/32, Dynamics LAN, and Scala, saw the average per-user time decrease on the three-user test—an indication of the benefits of caching.

The **Posting** test measured the amount of time to post the AP invoices entered in the Data Entry test through to the GL. We also posted a set of cash-receipt transactions through to the GL. We measured actual posting time and time to print posting journals.

Dynamics LAN's posting process is worth noting. First, it automatically runs all posting routines in a background process, freeing up your screen to do other work. (But we still recorded the time to complete the posting.) Second, you can simultaneously post from multiple workstations and optionally post through to the GL in one posting process.

Scala and Pro Series posted the best times, both under 2 minutes. Traverse was particularly slow in posting the AR cash receipts, something its makers hope to correct in an upcoming version.

The **Financial Reporting** test consisted of printing a summarized balance sheet and a year-to-date income statement with three columns. Two columns listed specific department figures; the third included figures for the entire company. Scala was unable to print a single income statement in the format we required and instead printed two income statements (one with the total company numbers and one with the two-column departmental figures). We recorded the time required to print both income statements.

Scala and Solomon IV produced these reports very quickly, whereas most others showed merely respectable times.

It is becoming a common practice for vendors to look at third-party-developed Financial Report writers instead of investing precious development resources reinventing existing software. One of the most popular Financial Report writers, FRx, has become a staple for many character-based accounting systems, and three of the vendors in this roundup (Dynamics LAN, Solomon IV, and WindowsPlus) recommend it as their high-end Financial Report writer.

We've included the FRx reporting times for these vendors. Although it doesn't improve the already fast reporting times of WindowsPlus or Solomon IV, FRx is significantly faster than Dynamics LAN's standard Financial Report writer and should be considered if you purchase Dynamics LAN.

(Price Waterhouse does not validate the financial statements these systems provided.)

The Concurrency test was an untimed exercise in how these packages address multiuser locking and concurrency controls. A poor locking scheme can lead to either process delays if it's too rigid or data integrity problems if it's too lax.

To determine how the packages addressed locking, we had two users attempt to update the same customer record. Impact Encore, Pro Series, and Scala had the most rigid locking schemes. None will allow update access to a customer record that another user already has. The others allow multiple users to update access to the customer record and will even accept the changes made by the first user to save the record. Most of these packages require you to refresh your screen with the first user's updates and make your changes again. Dynamics LAN gives you an option to post over the other data, instead of reentering your changes.

We also looked at concurrency during posting and other key processes. Generally, the software packages provided adequate concurrency controls and didn't unnecessarily lock files or prohibit users from key activities. There were two notable exceptions, however. Impact Encore will halt posting of AR transactions if a user has a customer open in update mode. The posting will resume when the customer record is released. Scala will not allow any users to enter AP invoices while AP is posting a potential scheduling hassle for larger companies. Results of the Concurrency test are not quantitative and are therefore not shown here.

Finally, we conducted the **Fault Tolerance** test, which examined how the packages reacted when we powered off the client during a posting. In the past, this hasn't been a pretty sight with most packages, resulting in data corruption and requiring restoration from a backup. But we found that the packages are getting better at minimizing the risk of data corruption. Most are using some sort of transaction tracking (monitoring processes to ensure the transactions are fully complete, and roll back to their original state if they aren't), which to be effective must be jointly controlled by the application and the database.

Accounting Vision/32, Pro Series, Solomon IV, and WindowsPlus were able to complete the Fault Tolerance test successfully. In each instance, we were able to restart and complete the posting immediately.

With Dynamics LAN, we had to perform a couple of steps, including running a utility program, before being able to repost. Great Plains indicated that a cleaner fault-tolerance solution will be available in the next version.

Three systems—Impact Encore, Scala, and Traverse—made a poor showing. Data was corrupted in each case and required either an extensive reconciliation process to determine where exactly the posting halted or a restore from backup. Results of our Fault Tolerance test are not quantitative and are therefore not shown here.

—Analysis written by Thomas White; technical guidance provided by Troy Yoner

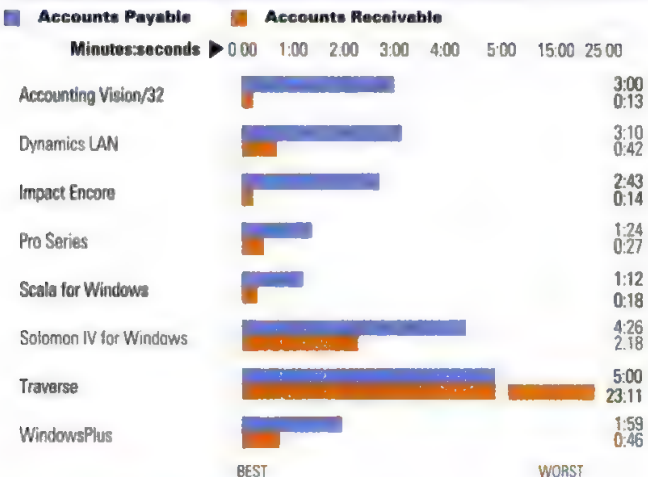
STANDALONE REPORTING



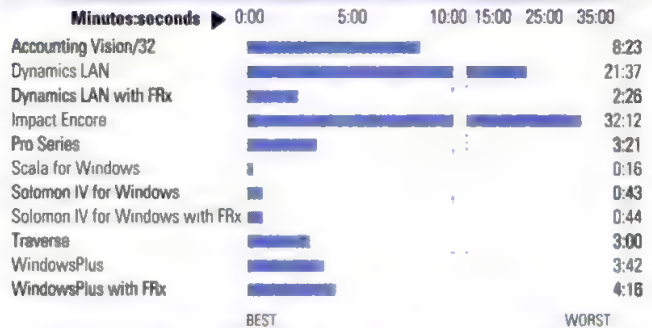
CONCURRENT REPORTING DEGRADATION



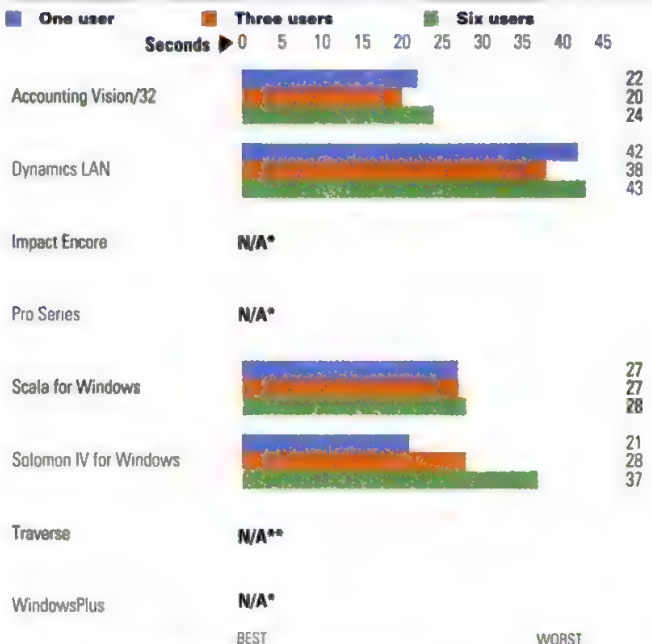
POSTING TIMES



FINANCIAL REPORTING



DATA ENTRY



N/A*—Not applicable. The program was incompatible with the Microsoft Test

N/A**—Not applicable. The program was not able to complete all the tests because of errors caused by contention

How We Tested

Our test-bed configuration consisted of seven Compaq Deskpro 486/66 systems, each with 16MB of RAM and a 320MB disk, and an HP NetServer LF 5/66 file server with 128MB of RAM and 4GB of disk space. The primary disk on the file server was striped for maximum performance. We used NE2000 network cards for the clients and an NE3200 for the server on our 10Base-T network. The network operating system was NetWare 3.12, and the clients ran Microsoft Windows for Workgroups 3.11 and DOS 6.22.

We provided each vendor with a test database to be converted into the package's data-file format. The test database consisted of 105,012 detailed GL transactions, 6,489 GL accounts, 3,000 vendors, 26,000 AP transactions, 8,000 customers, and 60,000 AR transactions. Vendor representatives were invited to optimize the network as desired, but no hardware or third-party software could be installed. Vendor reps were present for all tests conducted on their software.

We ran each test at least twice to ensure consistency, and the clients and server were returned to a clean state before each test.

We conducted five performance tests, each simulating a common accounting task. The **Standalone Reporting** test measured the time required to print

five reports: detailed AR aging, customer list, vendor list, detailed GL trial balance, and summary GL trial balance. The **Concurrent Reporting Degradation** test showed the degradation in printing time when reports were run concurrently. Reports were printed to spool files to prevent printer performance from affecting times.

The **Posting Times** test measured the time to post the invoices entered in the Data Entry test and 15 AR cash-receipt transactions. We timed the steps necessary (posting and printing) to post the transactions through to the GL.

The **Financial Reporting** test measured the time to print a summary balance sheet and a year-to-date departmental income statement.

The **Data Entry** test simulated the entry of AP invoices. We entered five invoices with four lines of distribution: first on a single client, then on three clients, and finally on six.

We also conducted untimed tests to measure multiuser concurrency and fault tolerance. We examined multiuser concurrency by testing such instances as: two users attempting simultaneously to modify the same customer record and attempting to add AP vendors during posting of AP invoices. On our Fault Tolerance test, we powered off the workstation during the posting of Accounts Payable invoices.

NetBIOS-compatible network, or a Unix server. You can use Btrieve or Level II COBOL file formats. In addition, Encore client PCs can be either Windows or character-mode, and both clients can simultaneously access the same database.

Many will find Encore's ability to attach images, sound, or video clips to master-file records an impressive—but not very practical—feature, at least for the foreseeable future. Syspro Impact believes that as imaging and other multimedia technologies become more prevalent, however, the benefit of scanning source documents, such as invoices or engineering drawings, and attaching them to appropriate records within Encore will give the program a significant advantage over its rivals.

Although Encore lacks some standard Windows features, the great depth of accounting features and the suite of modules make it well suited for manufacturing and distribution businesses. If you're more concerned with accounting functionality than all the latest graphical interface features, this may be a good introductory Windows package.

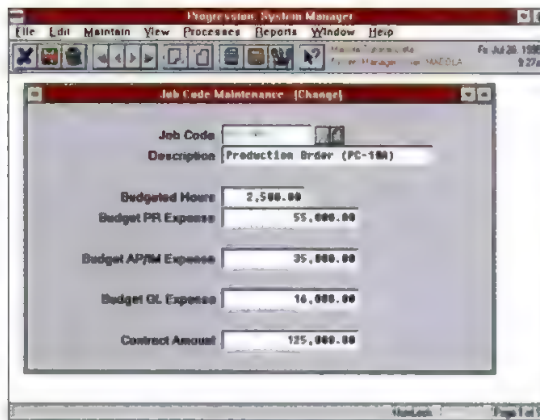
Macola Software

Progression Series, WindowsPlus Solutions

BY COLLETTE CLELLAND AND
STEPHEN HERLICK

The latest in the evolution of Macola's Progression Series is WindowsPlus, which upholds the tradition of fast performance and solid features characteristic of this product line. New Bank Book and Currency Manager modules, and new reporting and development tools, make the product even more attractive. It's only real shortcoming is that the usability of its new Windows interface falls short of several others in this roundup.

The basic WindowsPlus modules include GL, AP, and AR (\$995 each); there is also a System Manager (\$4,995). Macola plans to release distribution and manufacturing modules late this year and early next year, respectively. But Version 6.0 modules can't be used with Version 7.0 modules.



You can set up jobs within Macola's WindowsPlus Solutions and track actual costs versus the budget amounts set up on this screen.

ACCOUNTING FOR THE WINDOWS

Windows presentation features, such as the ability to size screens and tile or cascade windows, are welcome additions in WindowsPlus. Switching between screens is faster with this product than with most others we reviewed, and, except for a couple of key screens, the system provides MDI.

On the other hand, navigating during data entry is awkward in places. For example, when you move from the header to the distribution screen as you're entering an invoice, you can't return to edit the header screen without saving and closing the distribution screen and reselecting the invoice entry option from the menu bar. In addition, the PgUp and PgDn keys don't always work when they should, but you can click on the corresponding icons to move to the next or previous screen.

On report selection screens, unless you choose the Default option, you must Tab through all fields before you can begin printing your report. When you print a report to screen, you can't jump to any other function in that module until you close the report window.

Macola has retained its 15-digit, three-segment GL account structure from previous Progression versions. But now you can optionally assign a separate fiscal calendar to each subledger—beneficial for organizations with different cutoff periods. The product's automatic calculation of many financial ratios (for example, current ratio, receivables turn, and debt-to-equity) is a useful information management tool.

Job numbers have been added through-

out the system so that users can easily track job costs generated in the subledgers or in the GL directly. And job-cost reporting is provided in the System Manager module.

INQUIRING ACCOUNTS WANT TO KNOW

In AP, user-defined auto-distributions facilitate the allocation of costs, such as splitting rent between departments. A useful AR feature is the ability to generate service invoices and track the related profitability. Through Macola's AR module, users have up-to-the-minute reports and graphs of commission due, sales analysis, tax analysis, cash projections, projections—and more—at their fingertips.

The on-line inquiry facility can give you a tremendous amount of detail. It lets you drill down from any transaction in the GL to the originating document in AP or AR. But the ability to start the drill-down process from account-balance information, instead of just at the detail transaction level, would be a welcome improvement.

The standard reporting facility found in all the modules is quite extensive, and Macola has retained the feature that allows you to specify the date or time you want the report to be printed. Further, when

FACT FILE

Progression Series, Version 7.0, WindowsPlus Solutions

List price (2 to 5 users): Accounts Payable module, \$995; Accounts Receivable module, \$995; General Ledger module, \$995; System Manager module (and F9-The Financial Report writer and Enterprise Reporting System), \$4,995. **Requires:** Server: LAN Manager, LANtastic, NetBIOS, NetWare, Microsoft Windows NT, Windows for Workgroups. Workstation: 486/66 processor, 8MB RAM, Windows 3.x. **In short:** Macola's Progression Series, Version 7.0, WindowsPlus Solutions sports new development tools, foreign-currency capabilities, and improved cash management functionality. It continues to be one of the faster products on our performance tests, yet its Windows interface is awkward in places.

Macola Software, 333 East Center St., Marion, OH 43302, 800-468-0834, 614-382-5994; fax, 614-382-0239

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SUITABILITY TO TASK

	Power	Ease
Financial accounting	Good	Good
Customization	Excellent	Good
Reporting	Good	Good
Auditing and securing data	Excellent	Good

What If You'd Had A Tip To Bet It All On Secretariat?

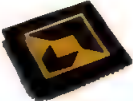
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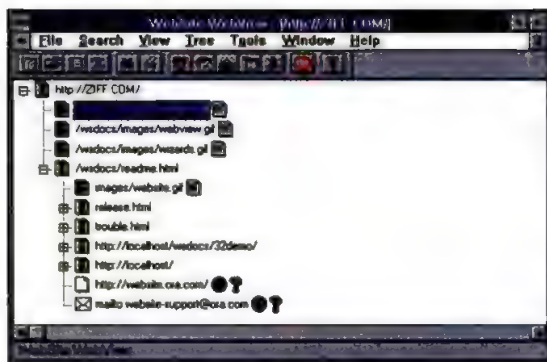
pages. The 324-page user manual covers all portions of WebSite and offers particularly strong guidance in using WebSite as a development platform.

EXTENDING THE WEB

WebSite's main attraction for many World-Wide Web administrators will be its unparalleled strength as a development platform.

Conforming to common gateway interface (CGI) 1.2 specs, WebSite allows just about any program or script to be run under the CGI. WebSite's CGI support is broken down into three categories: Windows CGI (which includes Visual Basic, Visual C++, and DLL programs); the Standard CGI, which derives mainly from the Unix world (covering Perl, Unix Bourne/Korn Shell, and Tool Control Language [TCL] scripts); and the DOS CGI (DOS programs running under a DOS shell). You can also define a Windows NT script (.cmd) as a CGI event.

The obvious attraction—especially for Perl scripts—is the ability to take an existing Unix server installation and ei-



WebSite's nifty WebView application graphically displays all your World-Wide Web pages and shows how they are related to each other.

ther move it to or replicate it on a Windows NT system. The only drawback is that the development tools needed for standard CGI development (Perl, shell, and TCL) don't ship with WebSite. But they are available as shareware on WebSite Central at <http://www.ora.com>.

The script examples that ship with WebSite (which are well explained in the documentation) illustrate how you can truly extend the power of the World-Wide Web with CGI scripting. Something as simple as creating forms is a matter of CGI scripting, for example. Several Visual Basic scripts are used to show how to display forms to browser users, determine the next action based on a user's input (ranging from changing content types to redirecting the browser to another URL), and, if necessary, translate the input to a database of some sort.

And there's one more script that you'll probably find useful, though you'll never show it to your users: statistical analysis of the user log through VB Stats, a Visual Basic script available on WebSite Central or from WebSite technical support. (You need to register to gain access to this support.) VB Stats takes output from the user log (which stores transactions in the Common Logfile Format) and breaks the data down into access attempts, IP tracking, and more.

Another menu item that ships with WebSite, QuickStat, sums up the number of users accessing the site, documents served, average per hour, and so on. Finally, there's a server log that covers the HTTP protocol number associated with a request, sent data, image-map

tracing, CGI tracing, access control, and authentication. (This server log is flushed whenever a server is shut down, however.) All these tools add up to top-notch tracking of server performance and transactions.

AN INSECURE FEELING

Creating interactive forms (which involves users running programs on your server and displaying the output to a browser) raises a sensitive issue that WebSite isn't fully capable of addressing—security. Like the majority of Windows NT-based Web servers, WebSite addresses security primarily on the file and directory level: Users (either explicitly named or defined by IP address) are authenticated to perform specific HTTP transactions (GET, POST, and HEAD) on specific files and directories.

WebSite goes a step or two beyond these measures by increasing the complexity of permissions (by adding *realms* to the permission hierarchy, above *groups* and *users*) and by adding a password for the administrator. But WebSite

*The script samples
that ship with WebSite
illustrate how you
can truly extend the
power of the Web with
CGI scripting.*

doesn't address security on the transaction level. This release doesn't support the Secure Sockets Level or Secure HTTP (though support for S-HTTP is promised in Version 1.1, expected this fall), which should raise a red flag for those who need secure Web transactions. You also can't use WebSite as a proxy server, but Version 1.1 will offer proxy support.

Security aside, WebSite 1.0 is a well-rounded product that should fill the needs of a great many users. If you're thinking of extending your server via programming or scripting, it should top your shopping list.

► FACT FILE

WebSite 1.0

List price: \$499 **Requires:** Windows NT 3.5 or higher, 12MB of RAM for Windows 95, 5MB hard disk space **In short:** WebSite is a developer's dream, offering a full set of tools and examples in interactively extending the Web server. And it includes enough Web-management tools to keep even the fussiest Webmaster satisfied. But because it lacks multithreading and relies on CGIs (APIs provide better performance), it thrives more in small to medium-size environments. Still, WebSite gives you much for your money: great documentation, lots of sample CGI scripts, and a noteworthy organizational viewer.

O'Reilly & Associates Inc., 103A Morris St., Sebastopol, CA 95472, 800-932-9302, 707-829-0515, fax, 707-829-0104

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SUITABILITY TO TASK

	Power	Ease
Setup	Good	Excellent
Administration	Excellent	Excellent
Customization	Excellent	Good
Security	Fair	Good

Turnkey Solutions: One Stop Shopping

AS THE INTERNET RAPIDLY evolves into the next publishing frontier, tens of thousands of businesses with something to say to the world are seeking affordable ways to enter this new electronic paper-space—above all, the World-Wide Web. There's a wide spectrum of options, from farming the whole process out to consultants and service providers to assembling the necessary hardware and software and building a site yourself. But is the do-it-yourself approach feasible for nonexperts? And if it is feasible, what's the most advantageous platform to do it on?

A couple of years ago, building and maintaining a Web presence required a lot of technical expertise. The only servers available ran on Unix; if your business was not already Unix-savvy, you had to make a major investment in time and resources just to get into the game.

Today, servers are available for many platforms, and hardware/software vendor solutions put server setup and management well within the reach of those with only modest technical knowledge. As a do-it-yourselfer, you'll still have to build appealing content to get the positive visibility you want on the Web, but today's turnkey server solutions help you focus on that task by hiding the intricacies of server management behind clever setups and intuitive configuration interfaces.

THE PLAYERS AND THE CHALLENGE

We reviewed turnkey Web-server solutions from four different vendors: Digital Equipment Corp. (Digital), Intergraph, Silicon Graphics (SGI), and Sun Microsystems Computer Co. These systems included workstations running Unix (Digital, SGI, and Sun) and an Intel-based PC running Windows NT (Intergraph).

A ready-to-run hardware/software solution can get your Web publishing operation off the ground in no time.

By Sean González

All solutions incorporate the Netscape Communications Server package.

Rather than specifying a particular system from each vendor, we mapped out scenario requirements and let the vendors send the systems each felt was most suited for the task.

We targeted Web servers that could handle a medium traffic load (roughly 250,000 connects per day) and support HTML 2.0 and 3.0 features (graphics, CGI scripts, forms, and tables), "server-side includes" (parsable HTML), and Netscape-specific features (that is, the Netscape API functions).

Our review evaluated five aspects of these turnkey systems: installation and setup, configuration, documentation, security, and extended functionality. Although we were eager to run formal performance tests, an impartial methodology for doing this has yet to emerge. Still, we did run some informal server-performance tests, though, and found the Intergraph solution to be approximately 5 to 10 percent slower than the other systems; we attribute this to a combination of the Pentium's slower I/O bus and the immaturity of the Windows NT TCP/IP stack.

INSTALLATION VARIATIONS

Of the four vendors, only Intergraph included a clear and easy-to-follow road map or checklist for setting up the system. But the remaining vendors typically expect you will purchase their solutions through a value added reseller (VAR), who would normally be responsible for helping you install and configure the system. In our judgement, however, these solutions are easy enough to install that, with the possible exception of the Digital system, most purchasers could probably get them set up, even without the assis-

tance of a VAR, in an hour or less.

System documentation, whether printed or electronic, ranged from meager (Intergraph) to confusing (Digital) to good (Sun), but none was outstanding. Fortunately, unless you manage to lose the entire contents of your system and need to rebuild it from scratch, you should be able to configure and run your system with the documentation provided.

Sun's inclusion of O'Reilly & Associates' *Managing Internet Information Services* is noteworthy. This book is an excellent resource for gaining a deeper understanding of the inner workings of servers and their underlying technologies; it's also helpful if you want to add functionality.

FORMS OF CONFIGURATION

Netscape uses HTML forms to configure and manage its Netscape Communications Server software (tested with all four systems). Sun and Digital have adopted this model, using HTML forms to perform all system and server-software configuration and management functions. The result is a tremendous reduction in the Unix proficiency required to manage and maintain these systems.

The Intergraph solution, too, is easy to configure and manage, but the company didn't have to do any special work to achieve this: Windows NT's graphical interface makes server management inherently easy. The SGI system is a bit of a hybrid: It doesn't use forms to carry out systems management, but many of its tools trigger Windows-based applications to perform Unix system tasks—a definite improvement over the bare system prompt and command line.

INSECURITIES

The weakest aspect of all our turnkey solutions is system security (as opposed to transaction security, such as handling credit card purchases and the like over the Internet). The perils of security breaches are real. Anyone penetrating your networks may be able to access sensitive data. Or, if someone breaks into your system and modifies your content, you could be held liable for what goes out on the Web under your name.

These vendors' approaches to security range from not visibly dealing with it (In-

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Netra Internet Server

Each of the turnkey Web-server solutions we reviewed had definitive strong points, and each deserves mention here. But only one product—Sun Microsystems' Netra Internet Server—combined

power and extensibility with easy setup and management.

The Netra has more than enough processing power to handle the 250,000-hit-per-day traffic load we targeted in our testing, and as a multi-processor-capable system (the only one in our test suite), it can be easily equipped to handle twice that traffic volume or to manage searchable content in addition to HTML processing.

The Netra's software suite makes it a full-featured Internet services and connectivity solution. Its Internet services include Netscape Communications Server, telnet, FTP, and a bunch of e-mail services: POP2, POP3, IMAP, and Sendmail v8 mail servers. And its management tools relieve you of much of the headache of setting up and maintaining a Web site. In partic-

ular, its simple system-recovery procedures will help you restore your visibility on the Web quickly should problems arise.

Although Intergraph's Web Server 10 couldn't be easier to manage and has clear cost-savings advantages (especially for those who already run Microsoft products), it's quite short on functionality at this point. Digital Equipment Corp.'s Internet AlphaServer promises to be a powerful, highly extensible, and easy-to-manage system. It's on the right track to earn an Editors' Choice in the future, but the product is not yet complete.

Silicon Graphics' WebForce INDY is wonderfully equipped for content building but does less than the others to relieve you of having to focus on server management and maintenance issues.

tergraph) to giving bad advice on how to manage your system (Sun). They all make an effort to address security issues, but none has created a solution that is a clear result of solid experience in dealing with Internet security.

You should be concerned about security on the Internet. It will be well worth the effort required to become thoroughly familiar with Internet security issues before you "go live" with your new system. For the vendors that work with them, VARs should be good resources for developing adequate security provisions for Web publishing operations.

We were impressed with the range of functionality some vendors put into their server solutions. We had expected to see little beyond the HTTP server software and some server-management tools. In fact, some of these solutions (Sun's, for example) are true multipurpose Internet servers, offering FTP, News, and e-mail in

BEYOND VENDOR PACKAGES

Several practical issues not directly related to the makeup of the vendors' product offerings will also have their impact on the success of your on-line publishing activities.

First, make sure you have adequate bandwidth in your Internet connection to support the kind and volume of Web traffic you anticipate (or hope for). A slow or

unresponsive site can give you a bad reputation on the Web, as users get exasperated while waiting for your pages to come up. If you ignore slow connectivity problems, your Web presence could hurt you more than help you.

Second, equip your server with as much memory as you can afford; this can make for a big performance improvement. Maxing system RAM helps cache as many pages as possible, which in turn reduces dependency on the I/O subsystem's ability to handle high throughput.

If you're planning to run a search engine on your server, consider a computer system that supports multiple microprocessors. Search engines gobble processor power.

Finally, make sure to ask your VAR about upgrade costs and options. Can you add as many disks, as much memory, and as many CPUs as you want; or will you need more servers to expand and support your Web publishing presence?

THE BOTTOM LINE

All the vendors in this review have put real effort into building turnkey solutions that provide functional, reliable, easy-to-use Web servers. But these products have not been simplified to be interchangeable and to only differ in quality. You need to make a sound, educated purchase decision to best allocate your time, energy, and money for building your presence on the World-Wide Web.

Intergraph Inc.

Web Server 10

BY SEAN GONZÁLEZ

Web Server 10 from Intergraph (\$4,495, or \$3,995 without the quad-speed CD-ROM drive and 14-inch color monitor) is a simple, cost-efficient, and powerful Windows NT Web server that rivals the performance of Unix Web servers for low to medium traffic loads. Although this package lacks most of the bells and whistles found on the other systems we reviewed, it's a reliable solution that should have you up and running on the Web in a short time.

Setting up the system is a no-brainer. After making all cable connections and hooking up an enviable multimedia keyboard (which includes speakers as well as microphone and earphone jacks), we



SUMMARY OF FEATURES

Multiuser Accounting Software

Continues

■ YES ■ NO

Products listed in alphabetical order

	AV/32	Dynamics LAN	Impact Encore	Pro Series	Scala	Solomon	Traverse	WindowsPlus
Estimated list price (10 users) ¹	\$6,500	\$11,000	\$6,000	\$5,500	\$22,500	\$3,500	\$5,500	\$9,500
Supported Platforms								
Network or host operating systems:								
LAN Manager	■	■	■	■	■	■	■	■
LANtastic	■	■	■	■	■	■	■	■
NetWare	■	■	■	■	■	■	■	■
Unix/Xenix	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Windows NT	■	■	■	■	■	■	■	■
Windows for Workgroups	■	■	■	■	■	■	■	■
Client operating systems:								
Macintosh	■	■	■	■	■	■	■	■
MS-DOS (character mode)	■	■	■	■	■	■	■	■
Windows NT	■	■	■	■	■	■	■	■
Windows 3.x	■	■	■	■	■	■	■	■
Databases	Btrieve, Scalable SQL	Btrieve, Ctree	Btrieve, COBOL, Fileshare	FoxPro	Btrieve, proprietary	Scalable SQL, SQL Server 6.0	Access	Btrieve
Suggested Windows client configuration:								
CPU	486/33	486/66	486/66	486/50	486/50	486/66	486/66	486/33
RAM	8MB	12MB	8MB	8MB	8MB	8MB	16MB	8MB
Hard disk space	N/A	100MB	N/A	N/A	N/A	N/A	100MB	N/A
System Administration and Security								
Displays list of users currently logged on	■	■	■	■	■	■	■	■
Field-level locking	■	■	■	■	■	■	■	■
Record-lock message identifies user	■	■	■	■	■	■	■	■
Record lock lets other users read file	■	■	■	■	■	■	■	■
Security defined by individual/group	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
File encryption of password file/all data files	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Time-conditional privileges	■	■	■	■	■	■	■	■
Audit trail of user activity	■	■	■	■	■	■	■	■
Assigns reports to run on another client on LAN	■	■	■	■	■	■	■	■
Integration								
Imports/exports:								
ASCII text	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
.DBF	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
.RTF	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
.WKS or higher	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
DDE/OLE support	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Data validation during data import	■	■	■	■	■	■	■	■
User Interface								
MDI support	■	■	■	■	■	■	■	■
Keystroke equivalents on all entry screens	■	■	■	■	■	■	■	■
Tab or Enter can be used to navigate entry screens	■	■	■	■	■	■	■	■
Use of right mouse button	■	■	■	■	■	■	■	■
User can change screen fonts, colors, and the like	■	■	■	■	■	■	■	■
Context-sensitive on-line help	■	■	■	■	■	■	■	■
Customization and Programmability								
User can modify user menus	■	■	■	■	■	■	■	■
User can modify entry screens	■	■	■	■	■	■	■	■
User can modify business forms	■	■	■	■	■	■	■	■
Customizations for user/group/all users	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Primary tool to modify screens and menus	VM Toolkit	Modifier	Dialog	FoxPro	Scala	Customization Manager	Access	Designer
Price (single user)	Included	\$1,000	\$1,200	\$199	Included	\$495	\$329	\$995
Source code available	■	■	■	■	■	■	■	■
Source-code programming language	C++	Sanscript	COBOL, Dialog	FoxPro 2.6	C	Visual Basic	Access Basic	COBOL
32-bit software	■	■	■	■	■	■	■	■

¹ This price includes the Accounts Payable, Accounts Receivable, General Ledger, and System Manager modules, and a Financial Report writer.
N/A—Not applicable: The suggested configuration does not include local disk access

SUMMARY OF FEATURES

Multiuser Accounting Software

Continues

		PC MAGAZINE EDITOR'S CHOICE				PC MAGAZINE EDITOR'S CHOICE		
	AV/32	Dynamics LAN	Impact Encore	Pro Series	Scale	Solomon	Traverse	WindowsPlus
Third-party modifications available	■	■	■	■	■	■	■	■
Third-party developers' guide	■	■	■	■	■	■	■	■
Workflow and Routing								
Interfaces with e-mail software	■	■	■	■	■	■	■	■
Interfaces with workgroup and routing software	■	■	■	■	■	■	■	■
Creates and manages task lists	■	■	■	■	■	■	■	■
Reporting								
Saves report parameters for future use	■	■	■	■	■	■	■	■
Changes fonts and inserts graphics on report	■	■	■	■	■	■	■	■
Uses Print Manager for forms/reports	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Prints reports to screen/file/e-mail	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
When reports are printed to screen the package can:								
Search for text and numbers	■	■	■	■	■	■	■	■
Split screen	■	■	■	■	■	■	■	■
Print without regenerating a report	■	■	■	■	■	■	■	■
Sets up reports to print at specified time	■	■	■	■	■	■	■	■
Sends reports to another client on a LAN	■	■	■	■	■	■	■	■
General Ledger								
Maximum number of characters/segments in account number	50, 50	20, 5	15, 15	24, 6	24, 6	30, 8	24, 7	15, 3
Transaction dollar limit	\$99 trillion	\$99 trillion	\$999 billion	\$999 billion	\$999 million	\$9 trillion	\$999 trillion	\$999 billion
Maximum number of periods that transactions can be retained on-line	65	Unlimited	Unlimited	Unlimited	12	Unlimited	Unlimited	Unlimited
Maximum number of budgets per account per period	■	Unlimited	10	Unlimited	5	3	2	99
Statistical accounts	■	■	■	■	■	■	■	■
Drill-down account analysis to subledger detail	■	■	■	■	■	■	■	■
Intercompany postings	■	■	■	■	■	■	■	■
Defines valid primary and subaccount combinations	■	■	■	■	■	■	■	■
Allows consolidations of multiple companies	■	■	■	■	■	■	■	■
Multicurrency conversions	■	■	■	■	■	■	■	■
Multicurrency consolidations (FASB-52)	■	■	■	■	■	■	■	■
Allocations:								
Multiple from/to accounts	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Statistical accounts in calculations	■	■	■	■	■	■	■	■
Assigns frequency of posting allocations	■	■	■	■	■	■	■	■
Accounts Payable								
Vendor-number length (characters)	10	15	7	6	10	10	10	12
Maximum number of bank accounts supported	Unlimited	Unlimited	Unlimited	Unlimited	10	Unlimited	Unlimited	Unlimited
Can combine two vendor accounts	■	■	■	■	■	■	■	■
Uses system-generated voucher numbers	■	■	■	No	■	■	■	■
Optional batch entry	■	■	■	■	■	■	■	■
Detects duplicate invoice numbers	■	■	■	■	■	■	■	■
Quick addition of vendors during entry	■	■	■	■	■	■	■	■
IRS Form 1099 flag by voucher/line item	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Allows one-time vendors	■	■	■	■	■	■	■	■
Allows customization of check format	■	■	■	■	■	■	■	■
Automatically reinstates invoice if check is void	■	■	■	■	■	■	■	■
Allows posting of intercompany vouchers	■	■	■	■	■	■	■	■
Prints checks in dollar-amount order	■	■	■	■	■	■	■	■
Reconciles checks against bank statement	■	■	■	■	■	■	■	■
User can set up automatic allocations	■	■	■	■	■	■	■	■
Prints cash-requirement report	■	■	■	■	■	■	■	■
Prints IRS form 1099	■	■	■	■	■	■	■	■

SUMMARY OF FEATURES

Multiuser Accounting Software

Ends

■ YES ■ NO

Products listed in alphabetical order

	AV/32	Dynamics LAN	Impact Encore	Pro Series	Scala	Solomon	Traverse	WindowsPlus
Accounts Receivable								
Customer-number length	10	15	7	6	10	10	10	12
Maximum number of ship-to locations per customer	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited
Creates parent customer for reporting purposes	■	■	■	■	■	■	■	■
Checks for duplicate cash receipts	■	■	■	■	■	■	■	■
Processes cash receipts for multiple cash accounts	■	■	■	■	■	■	■	■
Receives cash on account	■	■	■	■	■	■	■	■
Allows date-triggered recurring invoices	■	■	■	■	■	■	■	■
Writes off small customer-balance discrepancies	■	■	■	■	■	■	■	■
Prints detailed deposit slips for cash received	■	■	■	■	■	■	■	■
Commissions based on gross profit	■	■	■	■	■	■	■	■
Commissions based on payments received	■	■	■	■	■	■	■	■
Multicurrency transactions	■	■	■	■	■	■	■	■
Credits check by balance/days overdue	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Module reports:								
Sales analysis by customer class	■	■	■	■	■	■	■	■
Finance charge	■	■	■	■	■	■	■	■
Cash forecast by due date/average pay date	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Cash discounts taken	■	■	■	■	■	■	■	■

2 This feature is included with the Sales Order module.

using the GL drill-down feature. Authorized users can now print the details they need from any stage of their drill-down investigation.

A unique AP feature handles credit card payments: An invoice may be processed as a credit card payment, allowing liability to be transferred to a credit card vendor while preserving the purchase history and statistics for the original supplier.

THE FORMS HAVE IT

To create business forms, Pro Series includes the FoxPro Report Writer. You can incorporate multiple fonts and company logos into invoices, order forms, and checks, and print them via Windows. Standard system reports use the Pro Series print engine for performance and better control over report output. Users can view (with an option to save to file), print, or export the report to ASCII-delimited, Microsoft Excel, or Lotus 1-2-3 formats.

The standard financial-reporting tool will let you report on any user-defined account segment. More advanced reporting requires that a custom report be developed in FoxPro or a third-party Windows reporting tool.

SMOOTH INTEGRATOR

Pro Series integrates well with other Windows applications. Customer and vendor history may be automatically graphed

with Excel. In addition, you can create personalized marketing and dunning letters using the mail-merge feature, with integration directly to Word or WordPerfect for Windows.

For those who are interested in modifying their software to meet specific business needs, SBT long has been a favorite. SBT strongly recommends, however, that you seek expert advice before significantly customizing the product. In addition to making changes to its FoxPro source code, Pro Series will also allow less-involved changes, such as modifying data dictionaries and creating business rules, that can be made without touching a line of code. One nice addition would be the ability to tailor data entry screens without having to dive into FoxPro.

The File Browse utility is extremely handy for viewing your accounting data. The software comes with standard views, but system administrators can set up new views by user, including specific filters so you can protect confidential data. Because it's presented in an easy-to-use spreadsheet format, users can sort, filter, and search data as desired.

Pro Series' user manuals and on-line

▶ FACT FILE

Pro Series 3.01i

List price (5 users): Accounts Payable module, \$895; Accounts Receivable module, \$895; Financial Report writer, \$895; General Ledger module, \$895; System Manager module, \$895. **Requires:** Server: LAN Manager, LANtastic, NetBIOS, NetWare, OS/2, Microsoft Windows NT. Workstation: 486 processor, 8MB RAM, Windows 3.1. **In short:** Effective on-line inquiry, easy integration with other Windows products, and an innovative tool to conduct business on the Internet highlight SBT's Pro Series 3.0i. A significant improvement in the Windows interface should be realized with the next version of FoxPro.

SBT Accounting Systems, 1401 Los Gatos Dr., San Rafael, CA 94903; 800-944-1000, 415-444-9900; fax, 415-444-9901.

485 on reader service card

SUITABILITY TO TASK

	Power	Ease
Financial accounting	Fair	Good
Customization	Excellent	Good
Reporting	Good	Good
Auditing and securing data	Good	Good

turned on the system to complete the configuration tasks, which are clearly outlined in the package's installation and configuration notes.

These configuration notes are a complete, easy-to-follow road map to integrating the system into your network, using the Windows NT configuration routines. Once this task is completed, you proceed to configure the Web server software itself.

We were impressed by the Windows NT version of the Netscape Communications Server 1.1. It contains most of the functionality of its Unix counterpart, in-

cluding the ability to run multiple concurrent copies of the server (using Windows NT threads) to enhance server performance. Noticeably missing, however, is multi-hosting support. Until Netscape provides this functionality (we're told it soon will), this solution will not work for those who need to run multiple Web servers (with different names and IP addresses) off one computer.

EASY DOES IT

To install and configure Netscape Communications Server, you simply click the configuration icon. The rest is automatic.

(The Windows NT and Unix versions of the Netscape server use identical configuration procedures and screens; if you can handle one, you can handle the other.)

Web Server 10 comes with system hardware manuals and OEM versions of the Windows NT and Netscape Communications Server manuals. Although we didn't need the manuals at all to get the server up and running, when we needed specific information about the functionality of the Netscape server we were at a bit of a loss. Fortunately, the complete Netscape documentation is included on-line,

Win 3.1x Servers: A Web Site on Every Desk

By O. Ryan Tabibian

With the rising popularity of Web publishing, Web server products are popping up on a number of platforms, now including even Microsoft Windows 3.1x. Recently, several products that will turn your Windows 3.1 machine into a genuine Web server have been released.

It's not surprising that Windows 3.1-based servers haven't made an earlier appearance. As a Web platform, Win 3.1 has a number of shortcomings: It's an unstable operating environment with poor resource allocation and poor network performance. Nevertheless, with the evolution of in-house or departmental information servers running on TCP/IP networks, products like this have a place.

We looked at two Windows 3.1x server products: NetManage ChameleonNFS Personal Web Server and Quarterdeck WebServer. Our evaluation considered factors such as feature set, functionality, and ease of use.

NETMANAGE

Personal Web Server, from NetManage (408-973-7171), is one among 40-some connectivity tools included in NetManage's TCP/IP Applications for Windows, Chameleon NFS (list price,

\$495). It is installed automatically when you run the rather complex setup routine for the complete package. Don't look to the documentation for much help with setup, by the way.

While it certainly does serve up HTML files, Personal Web Server is quite basic. It has no security provisions or access control of any kind, but

Webmasters than as a serious work-a-day tool. It would certainly work fine to check out a personal HTML home page you'd built for yourself.

QUARTERDECK

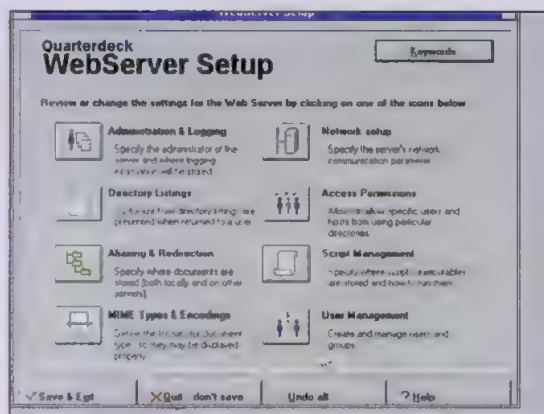
By contrast, the Quarterdeck WebServer, from Quarterdeck Corp. (estimated street price, \$129; 310-392-

9851), is clearly built for real-world use. It's easy to install and configure, and it contains an intuitive management tool through which you can handle all aspects of the server, including network configuration and user management.

WebServer (which comes with the LAN WorkPlace TCP/IP stack) has password-based access control and multithreading (it supports up to 16 simultaneous connections), along with a number of fairly advanced features such as image mapping and MIME support. Perhaps most important, it supports both DOS and Windows

CGIs and provides fairly detailed discussion of CGI scripting along with several sample scripts.

Quarterdeck is clearly the choice if you want to run a real Web server in Windows. But for complete Internet connectivity, NetManage's Personal Web Server will give you some basic Web experience in the bargain.



This intuitive yet powerful configuration and management console is the base of operations for all Quarterdeck WebServer setup operations.

it does offer extensibility via CGI and thus supports HTML forms. You configure the server via a simple dialog that lets you specify a communications port number, a document directory, and a default file (the "home page").

Our impression of Personal Web Server is that it's almost conceived more as training wheels for budding

SUMMARY OF FEATURES

Turnkey Web-Server Solutions

■ YES ■ NO

Products listed in alphabetical order

	Internet AlphaServer	Netra Internet Server	WebForce Indy	Web Server 10
List price	\$19,995	\$15,495	\$10,995	\$4,995
System Hardware				
Operating system	Digital Unix	Solaris 2.4 (Unix)	IRIX 5.3 (Unix)	Windows NT Workstation 3.51
Amount of memory tested	64MB	64MB	32MB	16MB
Maximum available amount	512MB	512MB	256MB	256MB
Amount of disk space tested	2GB	2GB	1.2GB	540MB
Maximum available amount	168GB	73GB	56GB	24GB
I/O bus type	SCSI	SCSI	SCSI	SCSI or PCI
CPU type/MHz	Alpha 21064/233	SuperSPARC II/75	R4600/133	Pentium/75
Maximum number of CPUs	1	2	1	1
Web Server Software				
Netscape Communications Server version	1.0	1.1	1.1	1.1
Graphics/forms/CGI scripts	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Server side included	■	■	■	■
IP-based access control	■	■	■	■
Host-based access control	■	■	■	■
User or password authentication	■	■	■	■
Public user directories	■	■	■	■
Templates/Multithreading	■ ■	■ ■	■ ■	■ ■
Customized error responses	■	■	■	■
GUI setup and maintenance	■	■	■	■
Default query handler	■	■	■	■
Multihosting support	■	■	■	■
Multiple servers in different ports	■	■	■	■
Common log format	■	■	■	■
Other Internet Servers				
FTP/News/E-mail	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Other servers	None	IP/IPX gateway	None	None
Additional Software				
Guided system setup	■	■	■	■
Authoring tools	■	■	■	■
GUI or menu-driven backup	■	■	■	■
Simplified system recovery	■	■	■	■
Enhanced security	■	■	■	■

N/A—Not applicable. The product does not have this feature.

in Post Script format; these files contained all the information we needed.

SECURITY CLEARANCE

The security provisions of Web Server 10 are frankly disappointing—or more accurately, nonexistent. It appears that Intergraph has left security entirely up to the operating system: a potentially dangerous situation.

Another disappointing aspect of this package is that, although it earned reasonably high marks as an HTTP server, it offers little more Internet functionality than that. The system ships with the Workstation version of Windows NT; if it included the Server version instead, additional Internet services would at least be possible. Moreover, the package would benefit from

the performance enhancements of the Windows NT Server. Before the end of the year, though, Intergraph plans to offer the bundle in a number of configurations, one of which includes Windows NT Server.

SILVER LININGS

On the other hand, the Intergraph package does include a copy of Microsoft Word, along with the Internet Assistant for Microsoft Word, an HTML-authoring tool. (See "Publish to the Web: No Experience Required," elsewhere in this issue, for a complete description of Internet Assistant.) Although it's debatable whether Internet Assistant is an ideal HTML-authoring solution, you do get the tools necessary to build your content immediately without having to acquire additional software.

If, like most people these days, you plan to author your HTML content under Microsoft Windows and then upload it to a server, you can take advantage of Windows for Workgroups and Windows NT's drive-sharing capabilities to seamlessly move files into your Web server. Other solutions would require NFS, which would mean both purchasing additional software and dealing with irritating file-naming problems between PC and Unix hosts.

Another advantage of a Windows NT solution is that it's far easier and more cost-efficient to integrate the functionality of your existing applications into your Web strategy—assuming you run a Windows-based environment. For example, it is common practice to use Microsoft Access as a database search engine to deliver searchable content on the Web; the same functionality would require a far more expensive database solution if run under Unix.

To perform routine system management tasks (like creating user accounts, performing backups, and doing system start-ups and shutdowns), you'll have to rely on the tools built into Windows NT. A centralized interface (like the ones offered by Digital and Sun) to perform all these management tasks would be nice, but at least Windows NT simplifies them to the point where this should not translate into significant management overhead for you.

Although the server performed satis-

▶ FACT FILE

Web Server 10

List price: \$3,995 (includes 75-MHz Pentium processor, 16MB RAM, 540MB hard disk space, Netscape Communications Server 1.1, 14-inch color monitor, Microsoft Word with Internet Assistant). **In short:** Because it is a Windows NT solution, the Intergraph system offers PC compatibility with workstation performance; it also gives you a simple solution to dealing with tedious system-management tasks. Invest 30 minutes, on the average, to set up the hardware and software, and you will have a fully functional Web server running one of the most popular server software packages available, the Netsite Communications Server 1.1. Although not a complete Internet services solution, if you are looking for an affordable way to build your presence on the Web, the Intergraph will meet your expectations without compromises.

Intergraph Inc., One Madison Industrial Park, Huntsville, AL 35894-0001; 800-763-0242, 205-730-2000; fax, 205-730-6188; <http://www.intergraph.com>.

MS on reader service card

help are thorough and well written. Both the on-line and hard-copy help often go beyond merely describing a feature to discussing the impact a choice will have on other areas of your accounting system. A handy Pro Series Help feature is the ability to perform a full-text search in order to locate a keyword or phrase quickly.

As for security features, Pro Series provides encrypted user IDs, names, and passwords, with access defined for each process. With Pro Series, you can even set up date- or time-dependent user privileges; so, for example, your AP clerk can enter invoices only from 8:00 to 5:00. In addition, Pro Series allows you to track login sessions, master-file changes, and processes run.

For a small to medium-size business, SBT's Pro Series 3.01i is an excellent choice. Its WebTrader module offers companies that are interested in doing business on the Internet a viable start-up option. Experienced Windows users may not love the less-than-stellar Windows interface, however.

Scala USA Inc.

Scala for Windows

BY SANDRA SAPONARA

If your business needs support for strong multicurrency accounting and a full suite of accounting, materials management, and manufacturing modules, you may want to let the still-crude Windows interface of Scala for Windows, Version 3.1.5, from Scala USA, Inc., take a back seat to its outstanding functionality. Scala for Windows is based on Scala's character-based product, which was developed in Sweden, is used in over 80 countries, and consists of 17 integrated modules, including manufacturing.

Released in late 1994, Scala's first GUI modules (General Ledger, Accounts Payable, and Accounts Receivable) can coexist on the same LAN with their character-based counterparts. The good news is that existing Scala users are supported, so they can ease into the Windows environment. In fact, most Scala For Windows screens let you use the same keystrokes as the DOS version. The bad news is that the

interface lacks many standard Windows functions, most notably MDI, which means you can only open only one window at a time. And Scala For Windows still uses a numbered menuing system to navigate through the system.

The standard Windows pull-down menus are included with Scala for Windows, and its tool bar can be configured to include print spool, language, help, and external program icons. The tool bar is handy for users who want to launch a spreadsheet, report writer, or e-mail while working in Scala; but icons for application-related functions aren't available yet. You can, however, tailor menus by user, and each one can be password protected.

ACCOUNT DIMENSIONS

Each GL account number is allowed up to four segments (main, cost, product, and project code) of up to six characters each. (Scala's next release will offer more segments and also will also allow you to rename them.) Five budgets can be maintained for each account, and statistical accounts can be configured to track non-

Report-Writer Report

By Thomas White

The accounting systems featured in this evaluation do a good job of presenting accounting information in standard reporting formats for analysis and decision making, but these days, companies are increasingly finding that they need more flexibility in their reporting.

Enter third-party report writers. These tools enable you to transform raw data into valuable information that can transform an average accounting system into an outstanding one.

We looked at four leading report writers recommended by the accounting software vendors whose products we reviewed here. Crystal Reports and R&R Report Writer are considered general report writers because they can access all data files in your accounting database, whereas the other two, FRx and F9, focus on financial reporting only and, therefore, are limited to General Ledger

data files. So picking the right tool for the job is important; a complex financial report is much easier to produce with FRx or F9 than with Crystal or R&R.

THE GENERALS

Crystal Reports, from Crystal (800-877-2340), is a powerful general-purpose tool that comes in two versions, Professional and Standard. The former is a must if you need access to SQL-oriented databases, such as Oracle, Scalable SQL, and Sybase.

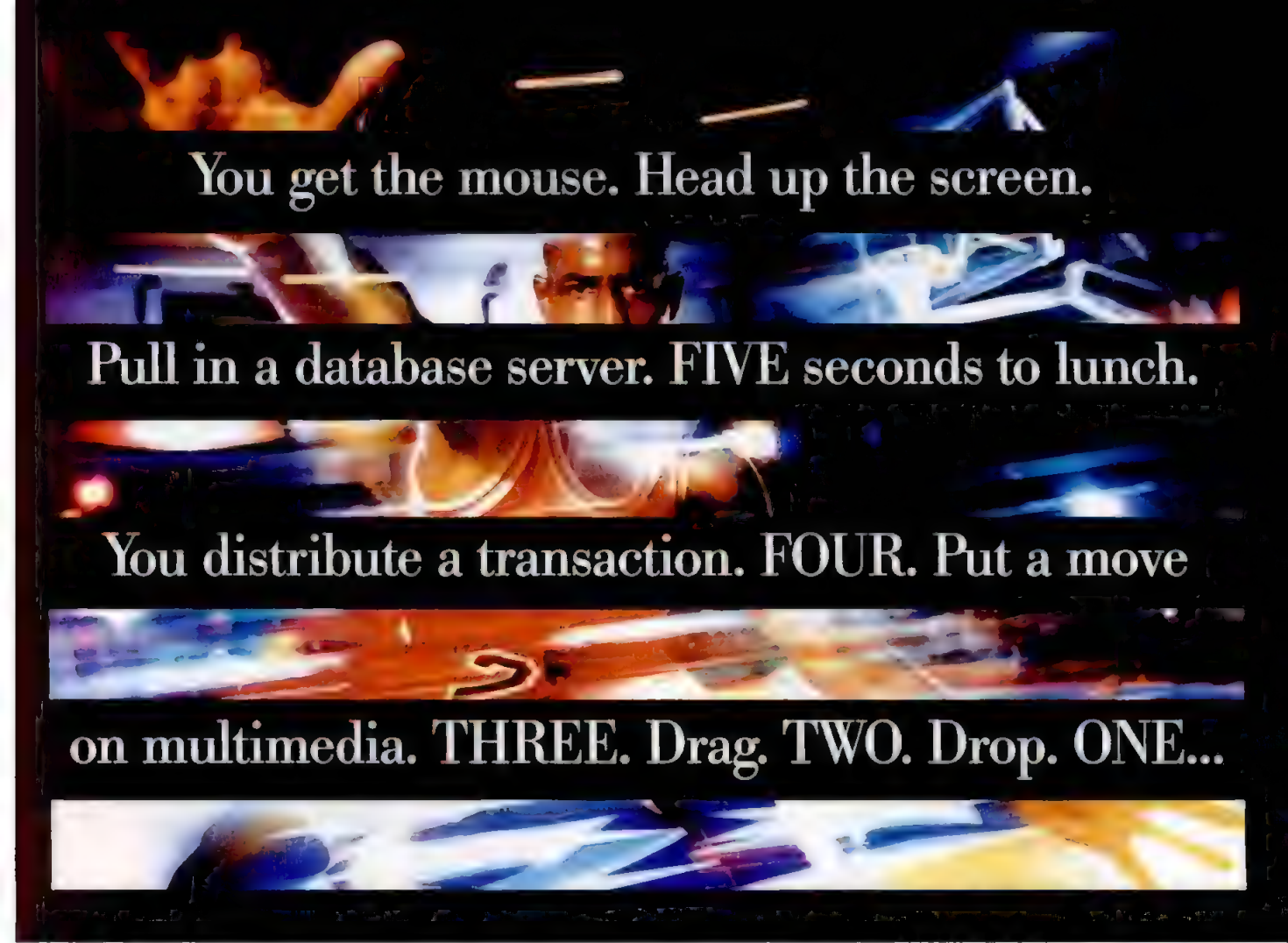
Crystal's Expert feature walks you through report creation. After you select the tables and files to include, Crystal displays the tables and all possible links between them. Simply connect the links you need, select the fields you want, define filters you want to apply, and you've got your report.

Accountants will love Crystal's ability to drill down on summary

reports to analyze details. Its built-in graphing utility lets you insert graphs directly into your report. And all Crystal reports can be printed, exported, or sent via e-mail.

The other recommended general purpose report writer, R&R Report Writer, from Concentric Data Systems (800-325-9035), initially gained popularity in the Xbase world, but most accounting users will want to look at their SQL Edition, which can access Btrieve and all leading SQL databases. (Solomon IV for Windows uses the interactive version of R&R for its standard reports.)

R&R has been certified as Microsoft Office-compatible, so Office users will find its look and feel familiar, even down to the Wizards. Like Crystal, R&R walks you through report creation and gives you numerous formatting options, including box- and line-drawing tools. You can also insert bitmap images (like logos) into



You get the mouse. Head up the screen.

Pull in a database server. FIVE seconds to lunch.

You distribute a transaction. FOUR. Put a move
on multimedia. THREE. Drag. TWO. Drop. ONE...

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It's easy to see why nothing propels you into the big leagues of object-oriented programming like our new VisualAge™ C++ version 3.0.

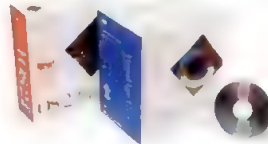
It transcends mere GUI builders. *Can your software do this?* This fully integrated development environment lets you generate tight, fast client/server applications with point-and-click ease and efficiency.

A simple drag-and-drop incorporates the truly scalable capabilities of a vast library of pre-built Open Class objects, which means you can create distributed client/server apps

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*This is a limited-time offer. To receive your Developer's Kit, simply complete and return the VisualAge C++ registration card by December 29, 1995. OS/2 Warp will be shipped on CD-ROM only. In Canada, please call 1 800 IBM-CALL, ext. 8012. Outside North America, please contact your local IBM office. VisualAge C++ for OS/400 will be available in 4th Qtr. 1995. The IBM software home page is located at <http://www.software.ibm.com>. IBM, OS/2, DB2, OS/400 and AIX are registered trademarks and VisualAge is a trademark of International Business Machines Corporation. All other trademarks are the property of their respective owners. †Infoworld review, 5/8/95 © 1995 IBM Corporation. All rights reserved.

The Apple Internet Server Solution

By O. Ryan Tabibian

Over the years, Apple Computer (800-776-2333) has been successful because it has consistently offered products that simplify day-to-day computing tasks. That is once again the case as Apple makes its first foray into the Web server market with a hardware/software package that combines WebStar server software from StarNine with its powerful Apple Workgroup Server. While it doesn't compete with the high end Unix or Windows NT products, this combination offers a fine solution to users looking for a simple way to provide Web services internally, or with performance limitations, over the Internet. (It's well suited for Web sites with low to moderate traffic levels.)

The Apple Internet Server is currently available in three hardware configurations. For our testing, we reviewed the high-end bundle built around the Apple Workgroup Server 9150/120 (\$8,209 list)—which sports a powerful 120-MHz PowerPC 601 processor—and WebStar, Version 1.0, from StarNine. The package also includes an HTML editing tool and a search engine.

Network performance has never been a strong suit of the Macintosh product line, as a result of both hard-

ware and operating system limitations. With the 9150/120 Workgroup server, Apple has delivered a powerful processor, but both the outdated NuBus architecture and the lack of support for preemptive multithreading in the operating system are potential performance bottlenecks. By early next year, Apple plans to rectify this

a number of clear improvements to the shareware, such as faster performance and easier and more robust management.

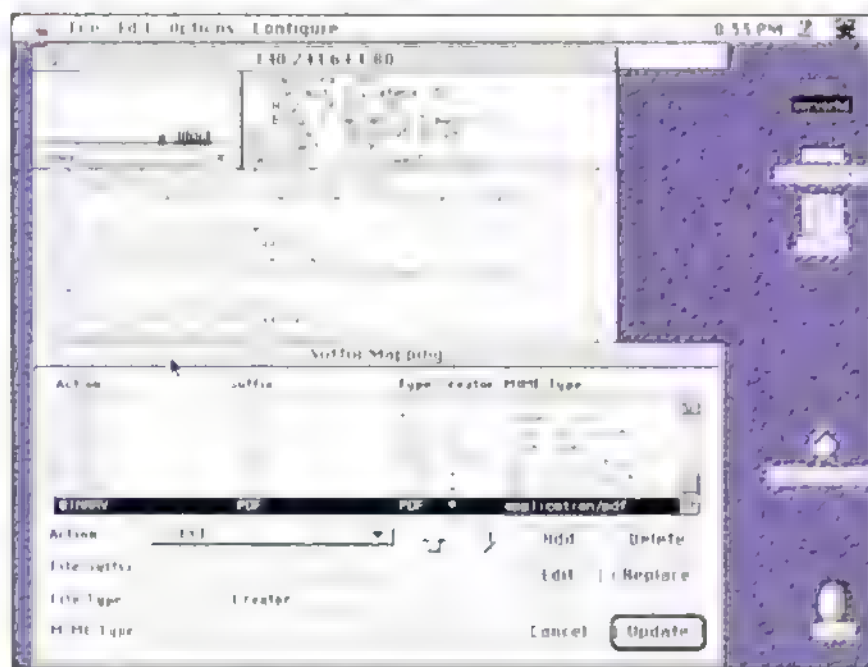
In fact, WebStar includes a new, intuitive tool for both local and remote management of the server. With it, you can monitor the status of the server, allow or deny connections, map binary

files, and manage multiple WebStar servers, all from within a single console. In addition, StarNine plans to add SSL security to the product in the near future.

Like many other Web servers on the market, WebStar supports advanced Web functionality through CGI scripts in a variety of programming languages, such as C/C++, MacPerl, and even AppleScript. StarNine has also dramatically improved the processing of CGI scripts. WebStar's shareware predecessor halted all other HTTP processes until a CGI script request was complete.

Today, WebStar can run multiple CGI scripts concurrently while servicing other HTTP requests.

Aside from the performance limitations that confine it to low- and moderate-traffic applications, the Apple Internet Server is a robust solution for either Macintosh shops or individual users looking for a simple yet powerful way to publish on the Web.



Apple's centralized management console provides a simple way to check the status of the server.

situation, with the implementation of the PCI bus and the release of the next generation of MacOS code.

WebStar is the only commercialized version of MacHTTP, the popular Macintosh Web-server software that is freely available on the Internet as shareware. (For the most recent release of MacHTTP 2.2, check out <http://www.biap.com>. WebStar makes

ing colors. The system includes screens to enhance security through IP packet filtering, but this solution lacks a tool that's easy to configure and manage, such as TCP wrappers, that will protect your server. Although the system is reasonably secure as is, it will be well worth your time to work with your VAR to ensure that additional security precautions have been taken to meet your company security standards.

One very positive security feature is the way the AlphaServer 1000 manages user accounts. The management panels create a default user environment that

locks users into a menu from which they choose to read mail or News, use the text-mode Web browser, change their password, or read the user manual. And the Electronic Locker won't let you create any accounts without passwords; in fact, it presents you with a list of automatically generated passwords if you don't supply one.

The AlphaServer 1000 isn't preconfigured as a mail server or FTP server, so you'll have to enable those functionalities on your own or get your VAR to help. Usenet News, on the other hand, is preconfigured, a mixed blessing. As long as

you use it for internal purposes only, you shouldn't have problems; should you choose to use your system as both a Web and a Usenet News server on the Internet, you may run into performance problems. Usenet News can be a highly resource-intensive service, so be judicious in your use of News on your Web server to avoid adversely affecting your Web presence.

Like Sun's Netra Internet Server, the AlphaServer 1000 does not address Web-content management and authoring problems; you have to work these out on your own (although Digital does supply names of companies that offer

the appropriate software in the server bundle). Like Sun's Netra Internet Server, Digital's Electronic Locker module should relieve you of worry about keeping the system available, thus letting you focus on building content.

Compared with the other Unix solutions we reviewed, the AlphaServer 1000 stands midway between very little need to interact with Unix (Sun's Netra Internet Server) and complete dependence on your ability to interact with Unix (SGI's WebForce INDY). As long as you are willing and able to invest moderate resources in Unix systems administration, which, thanks to the Electronic Locker, almost anyone in your office should be able to do—this solution offers you a great performance base on which to build a reliable presence on the Web.

Sun Microsystems Computer Co.

Netra Internet Server

BY SEAN GONZÁLEZ



The Sun Microsystems Netra Internet Server (\$15,495 as reviewed) is an impressive and highly versatile Internet server. The Netra runs a slew of Internet services including the Netscape Communications Server, telnetx, FTP, and anonymous FTP (a primary/secondary/caching DNS server), and a bunch of e-mail services as well: POP2, POP3, IMAP, and Sendmail v8 mail servers. Soon, Sun expects to offer IPX gateway functionality to provide your Novell network hosts access to the Internet without requiring a TCP/IP stack in every PC.

Setting up the system is easy; just attach the six cables included and power up. The system gives you simulated voice notification when the system starts and ends its boot-up sequence, a nice, user-friendly touch.

To configure the system you simply log on to a special setup account. Upon log-on the Netscape Navigator browser comes up and requires you to authenticate yourself as the server ad-

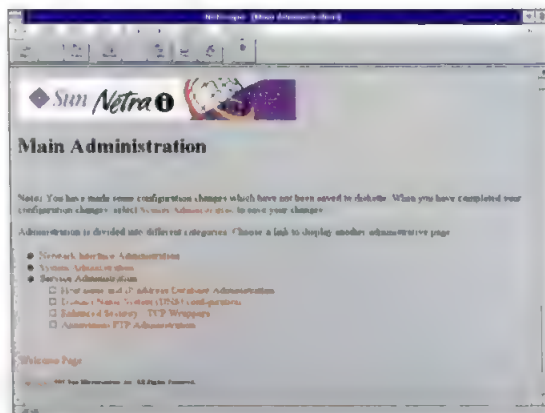
ministrator; you then see the Netra configuration welcome screen.

EASY CHOICES

You can choose between two configuration methods: the easy one and the easier one. The super-easy method uses a disk—supplied by your VAR—containing all the system-configuration information required to make the server a valid system in your network. Aside from simplicity, the advantage of this capability is that, should you ever have to rebuild your system from scratch, all you have to do is boot off the vendor-supplied CD-ROM, restore your configuration disk, and possibly restore your content if it was destroyed as well. The process should take no more than an hour.

In the merely easy configuration option, HTML forms guide you step-by-step through the system process, using an interface very similar to that used by the Netscape Communications Server. Your network administrator should be able to give you all the information necessary to configure your Netra server (that is, host name, IP address, network mask, default router, and whether the Netra server will be a primary/secondary/caching DNS server).

The configuration panels would benefit from more on-line help. Although the information required is fairly straightforward, in some cases the syntax required for supplying this information could vary; and the forms don't always make it clear how to proceed.



From the Netra Internet Server main menu, you can access all system management panels, including user accounts and system start-up and shutdown.

FACT FILE

Netra Internet Server

List price: \$15,495 (includes Sun Solaris 2.4 operating system, 75-MHz SuperSPARC II processor—second CPU optional—32MB RAM, 2GB hard disk space, Netscape Communications Server 1.1, Color monitor: 17-inch, \$2,000 **In short:** The Netra Internet Server is a powerful multiprocessor system. It offers not just a Web server but a very complete Internet services solution right out of the box. Coupled with its enhanced security features, the Netra server interface makes server management almost trivial, which lets you focus on building your presence on the Internet rather than on keeping a system up and running, unfortunately, you will have to figure out how to do that on your own. And because Sun systems are so popular among developers of Internet technologies and applications, this solution is likely to give you the greatest compatibility and growth potential.

Sun Microsystems Computer Inc., 2550 Garcia Ave., Mountain View, CA 94043-1100, 800-786-0404, 415-960-1300, fax, 415-856-2114; <http://www.sun.com>.

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HOW MAY WE SERVE YOU?

The Netra server comes preconfigured with the NCSA Web server software. To install and configure the optional Netscape Communications Server (as we did), you'll have to execute some Unix commands, which you'll find in an addendum sheet. We found a few errors in the addendum, which we relayed to the vendor for correction; but once we ironed out the details we were able to install the Netscape Communications Server in no time. (Note that Sun assumes that your VAR will help you remove the NCSA Web server and install the Netscape product.)

A very valuable resource included with the Netra Internet Server is a copy of O'Reilly & Associates' *Managing Internet Information Services*. This book gives detailed information about the protocols and programs running on your system; and it explains how to add new functionality should you need it down the road.

Security was clearly on Sun's mind when it designed the Netra package. Sun's enhanced security is based on the TCP-Wrappers, a utility widely used on the Internet that allows you to restrict access to system services by attempting to validate the requesting host's identity through DNS information. Configuring the utility is very simple, but Sun uses the simpler configuration of the TCP-Wrappers, which may or may not be flexible enough

Multiuser Accounting

velop your own custom add-on modules.

Of course, you can also customize Traverse without using these Access tools. All screens and prompts are fully multilingual (English and Spanish are supported so far), and users can tailor keyboard controls to their needs.

The Access platform offers two further significant advantages: First, Open Systems will soon have a client/server version of the product; second, Access provides the tools for an accelerated development cycle for new modules.

TRAVERSING INSTALLATION

Seasoned users of LAN-based accounting systems won't have any problems with Traverse, but the documentation provides little guidance for the novice.

Security is also shockingly thin. For any user with a full copy of Access, maintaining airtight security in a Traverse system will be difficult. Even for runtime Access users, security is limited to menu options, so you have to define security options for each user, which is time-consuming. Additional security can be set up via Access, but this isn't documented and requires some expertise.

DEFINING THE CODE

Traverse sports a 24-character alphanumeric account code with a maximum of seven user-defined segments. Once segments are defined, users can link them to form valid GL accounts, either individually or through a handy copy function. These segments can be used for sorting during on-line lookup; and when further linked to system-defined account classes and types, they form the basis for financial reporting.

Traverse permits multicurrency consolidation only if all companies share a similar account structure. Users can build foreign-currency translation tables with effect dates to support conversions within all modules on a transaction-by-transaction basis. The system doesn't calculate translation gains or losses, however.

Traverse streamlines transaction entry with customizable tab stops and display

styles—nice features found in all modules. Users may set up allocation accounts for automatic distributions to multiple accounts, which is helpful for postings from other modules. In addition, the system administrator can't prevent users from posting to prior or future periods.

Users can modify Traverse's chart-of-accounts inquiry screen to show a combination of current, prior, and future years' actual and budget data. The transaction inquiry can display current and history (purged) information, while the account-balance inquiry can toggle between current-, prior-, and future-year summary data. But Traverse lacks drill-down capability to view individual transactions that roll up into an account balance.

The AP module offers a traditional features set. Multicurrency is supported throughout the three-module library, demonstrating Open Systems' strategy to target companies doing business offshore. The voucherless invoice-entry func-

tion inquiry can display current and history (purged) information, while the account-balance inquiry can toggle between current-, prior-, and future-year summary data. But Traverse lacks drill-down capability to view individual transactions that roll up into an account balance.

PAYING UP

The AP module offers a traditional features set. Multicurrency is supported throughout the three-module library, demonstrating Open Systems' strategy to target companies doing business offshore.

The voucherless invoice-entry func-

tion can be batch-controlled and can take advantage of the user-defined tab stops. Recurring entries can also be posted; but the date last posted isn't stored, leaving room for duplicate postings in the same month. Amazingly enough, Traverse does not check for duplicate invoices in the open-item file during data entry.

Check processing is straightforward, allowing for invoice-payment selection based on discount and due date. Voided checks are properly reversed in both AP and GL. Traverse doesn't have a flexible check-layout routine, however, and can't process manual checks.

THE STRENGTHS

Traverse's biggest strength is its AR module. Traverse effectively delivers streamlined data entry and reporting features and has paid special attention to both tax and commission reporting.

Billing features include customer credit checking with on-screen warnings, multiple ship-to addresses, and the capability to pull from a user-defined database of commonly sold items. Once posted, invoices can be put on hold, which hides them from printing on a customer statement. But Traverse doesn't provide any flexibility in formatting either invoices or statements directly.

The cash-receipts function is equally user-friendly. It allows for partial and split application of cash and discounts and can automatically apply a receipt to a customer's oldest invoices.

Reporting shines in Traverse, mostly because of the many options. And its proprietary Financial Report writer matches up well with character-based accounting products. If Financial Report writers aren't your thing, you can use a full copy of Access with its report builder, or you can print reports directly to an Microsoft Excel file, ready for formatting and tinkering via Word or Excel. But Traverse's relatively strong reporting features are marred by the absence of a true AP cutoff report to prove to the GL at month-end.

Traverse's present functionality is relatively basic, but it does offer some unique strengths. Because it's built entirely on Microsoft Access, the package can be user-enhanced pretty handily with modifications or custom-developed modules. □



Traverse's present functionality is basic, but it does offer some unique strengths.

► FACT FILE

Traverse Accounting Business Software for Windows

List price (2 to 8 users): Accounts Payable module, \$1,200; Accounts Receivable module, \$1,200; General Ledger module (and Financial Report writer), \$1,200; System Manager module, \$1,200. **Requires:** Server: NetBIOS, NetWare, Microsoft Windows NT, Windows for Workgroups. Workstation: 486/66 processor, 16MB RAM, 100MB hard disk space, Windows 3.1. **In short:** This new offering from Open Systems is built on the Microsoft Access platform and is highly customizable. But limited functionality and poor performance may target this product to smaller companies.

Open Systems Inc., 7626 Golden Triangle Dr., Eden Prairie, MN 55344; 800-328-2276, 612-829-1419, fax, 612-829-1493

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SUITABILITY TO TASK

	Power	Ease
Financial accounting	Fair	Good
Customization	Excellent	Good
Reporting	Fair	Good
Auditing and securing data	Fair	Good

here, SGI's WebForce INDY requires you to begin by executing Unix commands at the system prompt. Once the installation process is under way, however, you'll be working with the same Netscape configuration screens found in the other solutions we reviewed.

BRUSH UP ON UNIX

To perform such system management tasks as backup, start-up and shutdown, user-account management, and software installation and configuration, you'll need to use Unix commands or learn how to use the SGI desktop and graphical Unix environment. Although the system includes a tutorial to guide you through the steps, there's no simple road map to get you up and running quickly.

Like every other system-management aspect of the INDY, security is more or less left up to you to figure out. Before you connect your INDY server to the Internet, you'll want to be sure that—with or without the help of your VAR—you've secured against unauthorized entry and tampering. And by the way, watch out for services such as NFS, which SGI has made easy to enable. While NFS may be a useful service, it's considered a high-risk protocol in Internet-accessible systems and should be avoided if possible.

AUTHOR AIDS

As with any other Unix system, you can add software to your INDY server to make it a comprehensive Internet services system. But the power of the INDY is best put to use by its authoring software. This collection includes the WebMagic Author and Digital Media Tools suite and Adobe Photoshop and Illustrator.

WebMagic Author is a WYSIWYG Web authoring tool that allows you to build multimedia HTML documents without keying a single HTML tag. To insert a graphic into your HTML document, for example, you drag-and-drop it from your graphics program into the page. To create a hyperlink, you highlight the link text or image and click a button to enter the link's

URL. The philosophy of the interface is to let you to focus on how your pages look without having to concentrate or waste effort on coding HTML tags to get the desired effect. The current version of WebMagic Author supports HTML 2.0 only, so with it, you won't be able to use Netscape's HTML extensions. The upcoming version of WebMagic Author, however (which should be out by the time you read this), is slated to support the Netscape extensions.

THE FANCY STUFF

The second component of the software suite, the WebMagic Digital Media Tools, is a collection of tools for creating and

manipulating image, video, and audio files. The SoundEditor enables mixing, editing, and overdubbing of tracks; and it can export files to a number of industry-standard file formats.

The MovieMaster converts SGI and QuickTime movies to either MPEG-1 or CinePak files. Image-

works allows you to enhance and manipulate images. And MovieConvert lets you convert from a number of industry-standard image formats to movie file formats and vice versa.

For creating or enhancing conventional images, you can't go wrong with two of the industry's leading packages, Adobe's Photoshop and Illustrator.

IN SUM

The INDY is an enviable Web authoring platform that's bound to cause some arguments amongst your peers as to who gets to use it next. As a high-end graphics-handling system, its enhanced I/O capabilities make it an outstanding Web-authoring environment and Web-server performer. But the product lacks intuitive system management tools and procedures to help you avoid having to figure out these tasks on your own. Once you know what to do, the tools are easy to use; but SGI could do a better job of providing a road map that would save your valuable time in figuring out and learning how to use the system. □

*WebForce INDY is an
enviable Web authoring
platform that's bound to
cause some arguments
about who's next in line
to use it.*

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the transition to a new 32-bit platform, we offer a snapshot of the Windows 95 support available from the major C++ development systems: Borland C++ 4.52, Microsoft Visual C++ 2.2, Symantec C++ 7.2, and Watcom C/C++ 10.5. The survey does not include MetaWare High C/C++, because MetaWare does not intend to specialize in Windows 95 support. The MetaWare High C/C++ Windows NT product does support Win32 development and offers a highly optimized compiler. (For the most recent comparative

reviews of all the products discussed in this story, see "C++ Programming: Significant Development" in our issue of April 11, 1995.)

We also look at two familiar foundations of 32-bit Windows development: The Microsoft Foundation Classes 3.2, the latest release of the most popular Windows application framework, and the Microsoft Win32 Software Development Kit (SDK). While the SDK may be of limited value if you are not targeting Windows NT, it does provide

some low-level goodies, including debug versions of Windows 95 system DLLs.

TOOLS IN TRANSITION

Like the operating system they target, the C++ tools in this survey are in states of transition. As we went to press, Borland's C++ 4.5 had not been updated to include pre-release versions of the Windows 95 libraries and header files. These will be offered in an interim release, Borland C++ 4.52, which should be available by the time you read

IS IT WORTH THE PURCHASE PRICE FOR WINDOWS 95 DEVELOPERS?

The Win32 SDK

By Matt Pietrek

Prior to the release of Windows 3.0, developers had to purchase both a C compiler and the Windows SDK in order to program under Windows. After Windows 3.0 became popular, vendors began to include SDK-equivalent functionality with their compilers (Microsoft C++ 7.0 included the actual SDK). This trend has continued with the latest generation of 32-bit C compilers; each major vendor now ships its compiler with pieces of the Win32 SDK or a functional equivalent. The standalone SDK does provide a few features that are not included with third-party compilers, but the extra purchase is probably not justified if you are developing for Windows 95 alone.

WINDOWS NT FOCUS

Initially, the Win32 SDK provided header files, import libraries, documentation, and sample applications for Windows NT. Toward the end of the Windows 95 test cycle, however, Microsoft decided to insert its Windows 95 programming files into this existing SDK instead of creating a new product.

In theory, this combined SDK should contain all of the files necessary for development in Windows NT and Windows 95. In actuality, however, its contents focus more on Windows NT and leave some Windows 95 features in the lurch. Instead of providing all of the relevant files for both operating systems and letting developers decide which files are important, the combined SDK offers only a subset of these files.

The Win32 SDK also fails to support Windows 95 16-bit programming adequately. Windows 95 uses many new 16-bit API functions in system DLLs like USER.EXE and KRNL386.EXE. To access

these functions, developers need updated header files like WINDOWS.H and import libraries that contain the functions themselves. Unfortunately, these 16-bit files are not included in the SDK. If developers require access to these files, they will have to purchase the Microsoft Windows 95 Device Driver Development Kit separately. Granted, 16-bit programming files do not belong in a 32-bit SDK, but Microsoft should have created a separate product for the Windows 95 files—both 16- and 32-bit.

Since Microsoft includes most of the SDK functionality with Visual C++, the Win32 SDK is primarily for developers who are using third-party compilers. Such compilers do offer some SDK-equivalent functionality, but they do not contain Win32 SDK's Windows 95 debug build.

The build offers debug versions of system DLLs such as KERNEL32.DLL and USER32.DLL. When used in conjunction with a debugger, these DLL versions are extremely useful in tracking down programming bugs. If you pass an invalid window handle to an API function, for instance, the debug USER32.DLL emits a diagnostic to the debugger that identifies the problem.

WIN32 SDK VS. MICROSOFT VISUAL C++

It is difficult to tell where Visual C++ ends and the Win32 SDK begins. The Win32 SDK confines its include files, import libraries, and documentation to functionality provided by the operating system. Visual C++ provides almost all of this information, then adds additional files for the C/C++ runtime environment and API. The only area in which the SDK differs from Visual C++, therefore, is in its collection of utility programs. Even here, however, some overlap occurs. For instance,

the SDK contains a utility called DLGEDIT that creates and edits dialog resources. Visual C++ does not contain the same utility, but it can create and edit dialog resources within its IDE.

The Win32 SDK utilities that are not included in Microsoft Visual C++ are relatively obscure applications that most programmers will not use on a regular basis. Many of the useful tools such as the Working Set Tuner (WSTUNE.EXE) are oriented toward Windows NT and do not work well under Windows 95. There is one subdirectory of programs, however, that is specific to Windows 95 development. With the exception of a few applications (including HeapWatch32), these Windows 95-specific tools are either recycled from the Windows 3.1 SDK or limited in usefulness.

If you are programming under only Windows NT, or under Windows 95 and Windows NT, the SDK is a worthwhile investment. There are debug symbols for the Windows NT system DLLs, system level debuggers, documentation, and many useful programming utilities. If you are developing under Windows 95 alone, however, the only incentives to purchase the Win32 SDK are the Windows 95 debug build and Microsoft's system-level debugger (WDEB386). Unfortunately, all of the import libraries and sample programs assume that you are using the Microsoft compiler. Unless you desire an overly exhaustive source of Win32 programming information, wait for your compiler's Windows 95 update.

Microsoft Win32 Software Development Kit. Available only through the Microsoft Developer Network Development Platform: \$495. Microsoft Corp., Redmond, WA; 800-426-9400.

Circle 486 on reader service card

MULTIUSER ACCOUNTING



The trickle that began two years ago is now a flood: LAN-based Windows accounting systems are here in force. How do they add up? We test eight contenders.

The Bottom Line on WINDOWS

By Ted Stevenson and Thomas White

It's been a tantalizing wait: Two years ago, we reviewed the first Windows-based multiuser accounting products to hit the market, predicting that with this breakthrough, Windows implementations would begin flooding the market. We were right on one count: Every major vendor in this segment of the accounting market now has a Windows product line. On the other hand, the transition has taken considerably longer than we anticipated, and it isn't yet complete. So far, few vendors have managed to bring a full suite of Windows-based accounting modules to market. The highest common denominator we could find for this review was the basic

► IN THIS REVIEW

Products reviewed:	
Accounting Vision/32.....	278
Dynamics LAN 2.1.....	280
Impact Encore 1.0.....	283
Progression Series, Version 7.0, WindowsPlus Solutions.....	288
Pro Series 3.01i.....	294
Scala for Windows 3.1.5.....	300
Solomon IV for Windows.....	302
Traverse Accounting Business Software for Windows 2.....	303
Late Out of the Gate.....	290

triumvirate of general ledger (GL), accounts payable (AP), and accounts receivable (AR).

Why so slow? The move to Windows has proved to be a monumental development effort for vendors. These are big, complex products, in many cases fully redesigned along radically new lines—and they *have* to work as advertised. Accounting customers are notoriously intolerant of software problems. Hence, developers' dollar investments have been huge, and testing has been more extensive and time-consuming than most vendors anticipated.

Nevertheless, Windows is clearly the name of the multiuser accounting game today, with research and development on character-based versions sloping off to near zero.

Windows confers many advantages, of course, but one—event-driven programming—is of particular importance in a fundamentally nonlinear process like accounting. Unlike older modal programs, where navigation is strictly through inflexible menu systems—backing out of one operation before moving into the next—event-driven programs let us move freely among activities as need dictates. For any but the most repetitive tasks, it's a far more efficient way to work. Event-driven programming is further enhanced by Windows' multiple document interface (MDI), which lets users keep several active

Dynamics LAN, Version 2.1 Solomon IV for Windows

Windows-based multiuser accounting has finally arrived, and it seems to be here to stay. No longer novelties, Windows products meet or exceed the accounting functionality of their DOS predecessors,

while offering greater ease of use and vastly improved integration and customization features. Innovative companies will capitalize on the latter, tailoring their software better than ever to organization-specific needs and procedures, and integrating them with third-party workgroup tools.

Of the eight Windows solu-

tions we reviewed, two stand clearly above the rest: Great Plains Software's Dynamics LAN and Solomon Software's Solomon IV for Windows. Although the products are different in many ways, they're alike in being designed from the ground up as Windows programs.

Dynamics LAN has the best user interface of the group,



processes open on the desktop at once, moving and transferring data freely among them.

SHARE AND SHARE ALIKE

Data sharing, in turn, is an important aspect of the other key Windows benefit, integration—across accounting modules, even totally separate applications. At the most basic level, the Windows clipboard lets you move data from one program window to another, whether it's from one screen of an accounting package to another,

or between the accounting software and a Windows word processor, spreadsheet, or e-mail program. With dynamic data exchange (DDE) or object linking and embedding (OLE), data transfers can be automated, and the synergy between various software tools grows enormously. Few accounting packages, for example, have charting capabilities, but every up-to-date Windows spreadsheet does, so with easy data transfer, accounting software users gain sophisticated financial charting and graphing.

HIGHLIGHTS

Multiuser Accounting

SUDDENLY, it's an all-Windows game. Today, every major vendor of multiuser accounting software has at least a partial suite of Windows-based modules on the market. They're a varied group, but look for consistently easier learning, more intuitive interfaces, and more logical operation.

YOU'LL NEED HEAVIER hardware to run these packages than for their DOS predecessors. Depending on the package, workstations may be as modest as a 486/50 with 8MB of RAM or may call for a 486/66 with

20MB of RAM. Power users will want Pentiums for most of these systems.

MORE AND BETTER customization is one of the major benefits of the move to Windows. Among the packages we review here, you'll find every capability from quick moving and retitling of data entry fields to building fully customized subapplications using vendor-supplied programming or scripting languages.

INTEGRATION of accounting data with third-party workgroup productivity tools like Lotus Notes is a key

emerging feature with some of today's advanced multiuser systems.

HIGH-TECH WIZARDRY, such as image and sound attachments are cutting-edge technologies that are beginning to find their way into some Windows accounting packages.

SOME SYSTEMS OFFER a dual interface option, with which selected users run Windows modules while others use DOS versions—and both access the same database. This lets companies leverage their existing hardware to maximum advantage.

strong accounting features, and intuitive and powerful drill-down inquiry. Dynamics LAN supports Macintosh, Windows, and Windows NT platforms and, as one of the two 32-bit applications in this roundup, should be well positioned to take advantage of Windows 95. Finally, Dynamics LAN's Integration Manager lets companies link their accounting systems with Lotus Notes and other productivity tools.

Solomon IV for Windows upholds Solomon Software's tradition of strong financial applications, enhancing it in this release with outstanding customization capabilities. While most of the packages we looked at have some customization capabilities, Solomon IV's are more flexible, comprehensive, and straightforward, particularly for those

familiar with Visual Basic.

Solomon's decision to use R&R Report Writer for all its standard reports and forms allows companies that purchase the third-party tool to modify Solomon IV's reports and forms—or create new ones.

We give honorable mention to Macola Software's WindowsPlus. Best known in the past for its distribution and manufacturing applications, Macola has strengthened the financial applications in the new product by adding a Bank Book module, to improve cash management, and Currency Manager, to address multicurrency needs. Once again, Macola did very well on our performance tests, and its customization module, Designer, is one of the better tools we reviewed.

In fact, Windows programs lend themselves to many kinds of customization, from the repositioning and renaming of fields on data entry screens to the whole look and feel of the application: from changes that adapt to the needs of an individual user to administrator-designed changes that roll through to entire departments. Windows not only enables a wider range of customization (even using generic programming tools like Visual Basic or Delphi), but in many instances, changes can be carried out by nonprogrammers.

THE PLAYERS

For this review, we once again teamed up with Price Waterhouse to monitor the state of the art: We've rounded up all the currently shipping file-server-based Windows products (general ledger, accounts-payable, and accounts-receivable modules only) from vendors with a strong presence in the marketplace (which means a track record and a well-established network of resellers and consultants): a total of eight well-known companies.

Forthcoming products from two more vendors—CYMA and Platinum—didn't ship in time to receive full reviews here. We preview them in the sidebar "Late Out of the Gate."

Several of the products we review offer

some client/server capabilities, such as Solomon IV for Windows with its implementation of BTI's Scalable SQL. Yet none makes full use of the kinds of key client/server database features, such as triggers and stored procedures, found in databases like Oracle, Sybase, SQL Server, or the forthcoming Version 4 of Scaleable SQL.

NEW LOOK OR NEW PERSONALITY?

The products in this evaluation break down roughly into two groups: new, built-from-the-ground-up Windows packages (Great Plains' Dynamics LAN, Intellisoft's Accounting Vision/32, Open Systems' Traverse, and Solomon Software's Solomon IV for Windows) and established packages with new Windows interfaces (SBT's Pro Series, Scala USA's

Intellisoft's Accounting Vision/32, the first multiuser Windows accounting package and an Editor's Choice in our last review, remains a worthy competitor but has seen others surpass its lead. Syspro's Impact Encore provides a pleasant interface, very strong inquiry capabilities, and solid accounting features. SBT's Pro Series did very well on our performance tests and, with its solid accounting features, should be considered by any company looking for a FoxPro-based, source-code-modifiable solution. Scala for Windows offers unrivaled multicurrency features and a full suite of accounting and manufacturing modules. Written in Microsoft Access, Open Systems' Traverse is highly customizable and integrates well with other Office applications.

Scala for Windows, and Syspro's Impact Encore).

Those that take the just-add-Windows approach don't take as much advantage of Windows technology as the newly designed programs (MDI capabilities being in important case in point), but they do offer some potential compensations. For example, SBT, Scala, and Syspro (mentioned above) all let you mix DOS and Windows versions on the same network, accessing the same database. This lets companies leverage their PC hardware investments to the maximum while taking advantage of the new Windows capabilities for selected workers. Another benefit of this dual-interface approach is the ability to make a gradual transition to the new environment with minimal retraining.

Our Contributors: This evaluation is a result of collaboration between *PC Magazine* and a team of accounting experts from Price Waterhouse. Team leader THOMAS WHITE, is a partner with Systems Advisory Services, a California-based consulting firm specializing in the implementation of accounting systems. The Price Waterhouse project leader was LUCIANO MEROCCHI, a manager in Mississauga. RICHARD C. BORLASE, WESLEY HOWARD III, and ED KNEITEL are senior managers at Price Waterhouse locations in the U.S. and Canada. COLLETTE CLELLAND, STEPHEN HERLICK, ROBERT MACWHIRTER, MURTAZA MOHAMED-TAKI, DAVID RICHARDS, and SANDRA SAPONARA are Price Waterhouse managers. MAUREEN G. DANCY and LAUREEN ROMANIUK are senior consultants at Price Waterhouse. TED STEVENSON was the associate editor in charge of this story, and THOMAS R. WHELAN—project partner in Price Waterhouse's office in Mississauga, Canada—coordinated the project.

Multiuser Accounting

The other side of this coin is that the basic thinking reflected in such products is rooted in DOS programming methodology, thus missing much of what's attractive and efficient about Windows. Assuming that such companies eventually move all the way to a product that does fully exploit Windows (or a successor technology), they're likely to find that they've just deferred some painful transitions.

FEATURES VS. FLEXIBILITY

As long and winding as the road to Windows accounting has been, the progress has definitely been worth it. In the DOS era, accounting vendors waged features wars; now, in the Windows age, they're concentrating more on flexibility, and providing tools for customization and integration. Every package in this review has at least some facilities for easily customizing data entry screens, menus, and reports; many go much further, providing system-wide configuration tools and even full-blown

scripting or programming languages. Most of these customization tools don't modify source code; therefore, changes don't get overwritten when you install a new version of the software.

Application integration is another long-term key to the importance of Windows-based accounting. An illustration that goes beyond the spreadsheet charting example that we touched on earlier is reporting, which was once considered a basic accounting-software function but is now emerging as too important to be left to

the accounting package. All these packages include traditional reporting capabilities, but they rely increasingly on third-party report writers for their main-line reporting capabilities. For the customer, this means better, more flexible reporting; for the accounting vendor, this means an easier job, because it doesn't have to build the entire report-writing application.

In a Windows-based world, accounting data can be easily integrated with a vari-

ety of tools for information flow (such as e-mail, discussion databases, and workflow automation systems). This improves overall information flow with less effort and boosts the entire organization's efficiency. With Accounting Vision/32's ability to print to e-mail, for example, sales reports can be sent to regional sales offices electronically, saving time and paper.

The popularity of workflow tools and the drive to reengineer inefficient processes has many companies looking for ways improve integration of their accounting software with their many information flows. Lotus Notes—integration tools available for Great Plains and Solomon allow workflow/routing applications, such as purchase-order requisition and expense-report processing, to link to the accounting software, speed up the flow of information, and prevent substantial rekeying.

MULTIMEDIA ACCOUNTING

Advanced Windows-based techniques like attaching images (scanned invoices, orders, or memos, for example) to data records are beginning to appear in accounting products like Impact Encore. In fact, Impact Encore users can even attach sound annotations and video clips. Func-

In a Windows-based world, accounting data can be easily integrated with information-flow tools.



MULTIUSER ACCOUNTING

Suitability to Task

For the **financial accounting** category, we looked at the features and functionality found in the G/L, A/P, and A/R modules. For each package, we evaluated more than 200 features, such as a chart of account flexibility, budgeting, allocations, on-line inquiry, history retention, payment selection, bank reconciliation, billing, and cash receipts. We also looked for high-end features such as multicurrency, consolidations, and multicurrency processing.

Given the importance of **reporting**, we decided to evaluate this area separately. Four types of reporting were considered: standard reports, financial reports, system-wide report writers, and on-line inquiries. We examined the capabilities and flexibility of each

We chose four categories in which to evaluate the eight accounting software products. We did not assign weights to each category or assume one was more important than another—that depends on each business's particular needs and circumstance. We also evaluated ease of use, considering the facility with which users could conduct each task, along with the effectiveness of the graphical interface, on-line help, user documentation, and vendor support.

Finding an integrated accounting system that will meet all a business's needs exactly is virtually impossible. What most businesses hope for is an 80 to 90 percent fit. The ability to be tailored to meet or exceed that percentage is what we considered for this category. **Customization** can include the ability to tailor a system via setup screens, programming-related alterations, third-party enhancements, or source-code modifications.

Auditing and securing your data considers the manner in which these systems protect your valuable data and maintain the data's integrity. We looked at the completeness of the audit trail, system security, and fault tolerance. In addition, we put each package through in-depth performance tests.

SUITABILITY TO TASK		
	Power	Ease
Financial Accounting	Poor	Poor
Customization	Fair	Fair
Reporting	Good	Good
Auditing and securing data	Excellent	Excellent

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there for years.



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Great Plains Dynamics is already the world standard for Windows™ financial management applications. Thousands of businesses around the globe have made Dynamics the most widely used software of its kind—not by a little, but by a huge margin. Dynamics commands 74% of the market.

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Dynamics is the first suite of financial management applications with an architecture designed specifically for the Windows environment—not a DOS product behind a Windows face. And with Dynamics Release 2.1 we've taken openness, performance and stability to even higher levels.

Dynamics is the first truly 32-bit financial management software, and it's optimized for Windows NT. In fact, Dynamics has the world's largest installed base running financial management applications on Windows NT.

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And isn't it reassuring to know that all this is from Great Plains Software, the company recognized as the undisputed leader in customer service? We've helped more customers move to Windows than all competitors combined.

If you're considering financial management applications for any Windows environment, your choice is clear: Dynamics from Great Plains Software, the leader in Windows financial management applications.

For a free CD that gives you a detailed introduction to Dynamics or to get in touch with your area's authorized Great Plains Dynamics Partner, fax your request to 701-281-3700 for fastest service, or call 800-456-0025 and press one. Or find us on the Web at <http://www.gps.com/>.



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tionality like OLE that has become standard in up-to-date Windows desktop applications—though only partially exploited in these packages so far—will have a wide range of applications in accounting systems, as will more specialized data links like Notes/FX.

Accounting applications soon will be communicating with the world at large over the Internet. SBT Accounting already has launched its WebTrader module, which allows a World-Wide Web server to act as an order-collection point and provide other direct links between customers and a company's accounting system. The possibilities are largely unimagined, let alone untapped.

Although features haven't been the main focus of this first generation of Windows accounting systems, slow but steady progress has been made in this area. Multicurrency processing, for example, which was an exotic high-end feature two years ago, is available in one form or another in most of today's packages. Products are adapting more to the needs of large, multi-departmental companies by providing heftier, more flexibly structured GL account numbers (which also facilitates multicompany consolidations, of course). The ability to drill down from a GL account balance all the way to the originating source documents in the subledgers is becoming commonplace. And keep in mind that the increased customizability that goes with the Windows territory substitutes, to a large extent, for vendor-supplied feature innovations. In many cases, customers can create the features they need.

THE PRICE OF PROGRESS

For the short term at least, one result of the shift to Windows will be increased cost to customers. First of all, the products themselves are generally more expensive than their character-based predecessors. Some, like Dynamics LAN, have increased module prices as much as 25 percent. Others, like Impact Encore and Solomon IV, are pricing on a per-user basis that can bump prices to \$5,000 or more per module for larger companies. You'll also need to figure in costs for customization tools and report writers.

Then there's the cost of the hardware necessary to run them adequately (not a new issue in corporate desktop computing

or in any way unique to accounting). These packages really require fast 486s or Pentiums for snappy performance, in some cases with a minimum of 16MB of system memory. These facts are reflected in our testing configuration. Our performance tests pounded on these systems in the areas of reporting, posting, and data entry. Of course, the new interfaces had the greatest impact on the data entry tests, yet with the exception of Open Systems' Traverse, we saw better-than-expected times. See "Benchmark Tests" for complete testing details.

LOOKING AHEAD

What options lie beyond this first generation of Windows accounting systems? One of them is the new generation of Windows itself: Although Windows 95 wasn't released by press time (and consequently couldn't be tested), these packages should run fine under it (as most Windows 3.x products do). The Great Plains and Intellisoft products are 32-bit applications that may be able to take specific advantage of the new OS's capabilities.

Novell's NetWare always has been the network OS of choice to run accounting software. But with BTI's release of Btrieve for NT, most of these vendors can offer a Windows NT solution with little effort.

Also on the Windows NT front, many of the vendors have announced SQL Server versions of their software geared to the needs of larger organizations. With SQL Server and Windows NT, vendors now can offer true client/server applications, using a powerful relational database that can run on Intel or RISC platforms. Great Plains, Open Systems, and Solomon have announced SQL Server products.

Along with the move to new platforms, the trend in the corporate accounting-software market is clearly toward higher levels of cost and complexity. While customers may look forward with some trepidation to the coming transitions, there's no question that they'll be buying better business solutions. Read the reviews that follow and chart your path to the future.

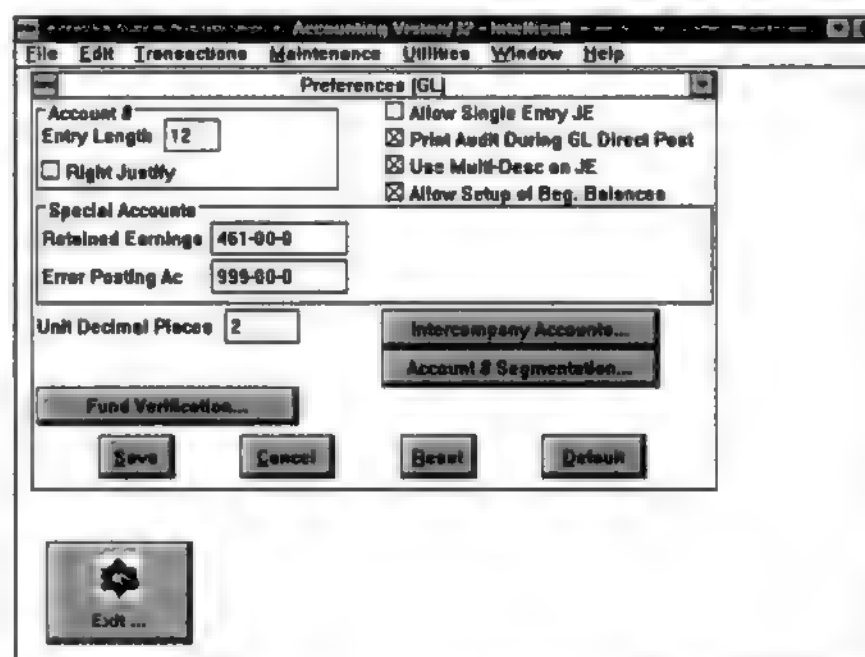
Intellisoft Inc.

Accounting Vision/32

BY RICHARD C. BORLASE AND
LAUREEN ROMANIUK

Intellisoft's Accounting Vision/32, as the first high-end Windows accounting product ever reviewed in a *PC Magazine* accounting evaluation, drew compliments for its clean user interface and many unique accounting features. Compared with the other, newer Windows accounting systems, AV/32 may no longer look quite so shiny, but Version 3.5 remains a worthy competitor in this increasingly crowded field.

Originally developed for the 32-bit OS/2 platform and written in C++, AV/32 is well positioned to take full advantage of Windows 95 and Windows NT. Its peppy



Accounting Vision/32's powerful general ledger includes the ability to process intercompany accounts and fund verification as indicated on this setup screen.

navigation through the system is even more impressive when you realize it requires less memory (4MB minimum) than most of the other products in this roundup.

THE DEVIL IS IN THE DETAILS

AV/32's GL provides numerous useful features. For those who require excruciating detail, AV/32 can support account numbers up to 50 digits long. Fortunately, you can set up account aliases to minimize keystrokes. You also can restrict users from posting to specific account segments and even restrict posting to a specific account if you have exceeded its budget.

Companies with foreign operations can consolidate multiple subsidiaries with different currencies and conversion rates and with different charts of accounts. But AV/32 does not support multicurrency transactions

We hope you have half
as much **fun** as we did.



The Microsoft® Windows 95 operating system is here. And so is a whole new generation of software and hardware designed to help you get the most out of your PC. Just look for products with the Designed for Windows 95 logo. If you can handle any more excitement, check out our on-line launch event at <http://www.windows.microsoft.com> where you can learn even more about Windows 95.

Windows 95



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Wizards

Windows Explorer

task bar

device manager

Start button

Network Neighborhood

and tons

of other

cool stuff.

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Multiuser Accounting

and is not FASB 52-compliant. According to Intellisoft, an International Currency module is forthcoming; it should be available by the time you read this.

If you require a system with strong inquiry capabilities, you'll be disappointed with AV/32. The package has a few pre-defined transaction-query screens but won't let you dynamically drill down to successive levels of detail. Therefore, you're relegated to the time-consuming task of printing reports on-screen to locate the information you require.

THE ADDED BONUSES

AV/32's AR and AP modules do a good job of meeting standard business requirements. A feature that particularly stands out is the ability to flag invoice line items, rather than the entire invoice, for 1099 processing. Alternate keys can be set up for vendors and customers to ease data access. The AR module offers a Schedule Payments option for financed sales; it will track both sales and interest revenue for time payments by customers.

This product has very little batch-processing control. In fact, it truly lends itself to use by empowered end users who enter their own transactions as they occur and run postings and reports on demand. This

decentralized approach is one of the product's most unique characteristics.

Intellisoft offers several modules to support the basic GL, AP, and AR modules reviewed here, including Data Manager, Fund Accounting, Purchase Order, Point of Sale, Inventory Management, Sales Order, and Payroll. When implemented, they're tightly integrated and contribute to a well-rounded accounting product suite. And all business forms, such as checks and statements, can be modified to meet your unique formatting requirements.

HAVE THAT REPORT ON MY DESK

AV/32's report writer is quite functional, but you'll need some programming skills and training to master fully the power of this tool. Virtually any AV/32 data (summary or detail) can be accessed with the report writer, and reports can be printed to screen, printer, file, or any MHS-compliant e-mail address. Unfortunately, the report writer can't produce boardroom-quality reports that include multiple fonts and other word processing-like formatting.

Where the report writer let us down, Intellisoft's Data Manager module compensated by letting us easily use DDE to link to various Windows products (Microsoft Excel, Lotus 1-2-3, Maximizer, and Quattro Pro) for high-quality output of reports, charts, graphs, and other documents. For users who are converting from other systems, the data manager provides DDE support for importing data, and Intellisoft provides an on-line checklist of the necessary steps.

TAMING THE VERTICAL

AV/32's Vertical Market Toolkit (included with the System Manager module) is a handy tool to customize users' desktops, on-line help, data entry screens, reports, and forms. While adding new data elements by users is prohibited (thereby maintaining the consistency and integrity of the database through future releases), any existing field may be moved or hidden from view. You can make the screens as complex or as simple as you wish without having to worry about displaying programming expertise, and your changes won't be overwritten by subsequent releases of the software.

A timesaving feature expected in the next release is the ability to customize

screens for a group of users, instead of having to make changes for each individual. If you require more complex customizations, you can create data entry screens or add-on modules with development tools like Visual Basic and access them via AV/32 menus.

AV/32's hard-copy and on-line documentation is disappointing; it's as much as four years out of date in some places and hasn't kept pace with the product's development. As a result, many powerful features aren't documented anywhere in the product. This presents an absolute need for training or experienced support for implementation.

If you require local customization, along with any of the unique accounting features of AV/32, and drill-down queries aren't critical to your needs, this product is worth your consideration. The implementation may be challenging, however, given its many features and limited documentation.

Great Plains Software

Dynamics LAN

BY LUCIANO MEROCCHI AND
MAUREEN G. DANCY



An innovative product that truly takes advantage of Windows technology, Dynamics LAN, Version 2.1, from Great Plains Software, is built from the ground up with its own toolset, Dexterity, a rich C-like development environment. This 32-bit application has a wonderful user interface for Windows or Macintosh clients, an excellent query facility, a strong feature set, and tight integration with Lotus Notes and other important business tools. Performance has improved vastly since Version 1, but Dynamics LAN still requires a powerful PC for acceptable speed.

As for installation, the Dynamics LAN routine can be daunting, especially for the novice. In addition, some maintenance operations, such as setting up new companies, are significantly more complex than for others in this review. Relying on a reseller or consultant is recommended.

If you like graphical interfaces, you'll immediately warm up to the Dynamics LAN look and feel. Not only will you find

▶ FACT FILE

Accounting Vision/32

List price (2 to 5 users): Accounts Payable module, \$1,495; Accounts Receivable module (and Financial Report writer), \$1,495; General Ledger module, \$1,495; System Manager module, \$1,495. **Requires:** Server: LANtastic, LAN Manager, NetBIOS, NetWare, Microsoft Windows NT, Windows for Workgroups. Workstation: 386 processor, 4MB RAM, Windows 3.1. **In short:** This pioneer of Windows accounting has lost some ground to its new competitors but still offers some unique accounting features and an easy-to-use customization tool. Outdated manuals and on-line help make Accounting Vision/32 more challenging to implement.

Intellisoft Inc., 2114 W. Mayfield St., Arlington, TX 76015; 800-933-4889, 817-467-7243; fax, 817-467-7133.

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Financial accounting	Good	Good
Customization	Good	Excellent
Reporting	Good	Fair
Auditing and securing data	Good	Good



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Now you can see numbers from any angle. List them, chart them, sort them in ways that simplify analysis, that reveal the answers you need. With new Microsoft® Excel, you can use AutoCalculate to find the sum, average, count, minimums, or maximums of specific cells simply by highlighting them. (You no longer create scratch formulas every time you need an answer.) To spot geographically based trends and relationships, use the new mapping capabilities of Microsoft Excel to analyze sales by territory, for example. PivotTable® views let you rearrange the headings inside your spreadsheet to get a new view of your data. If you want to view revenues by product instead of by region, simply move the "product" heading and the entire table adjusts. And for people who value the different perspectives different people can offer, Microsoft Excel now lets multiple users enter and edit data in the same worksheet at the same time.

Everything from recalculations to pivot tables is faster. Routine tasks now happen automatically.

Answers appear in record time because formula recalculation, charting, cutting, pasting, and database operations are faster than ever. Up to 70% faster. And now that the software can sense what you are doing and complete the process for you, fewer steps are required to complete a task.

AutoComplete, for example, speeds data entry by recognizing the first few letters of a repetitive entry and automatically finishing the word for you.

Using the Template Wizard can help you get a head start on your work by turning existing spreadsheets into templates and by setting up an automated system to track important fields in a separate database. Nothing slows you down, not even questions. To find out the best, quickest way to do something, you ask the Answer Wizard. "How do I get this page to print sideways?" Type in the question and the Answer Wizard will show you how.



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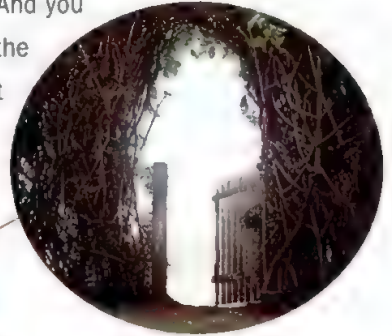


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The software learns your typing habits. It lets you concentrate on the words, not on how to spell them.

Spell-checking now happens on the fly, as you type. Misspelled words are underlined so you can correct them as you go. Click on the right mouse button and alternative spellings appear. Common mistakes everyone makes when typing are corrected by the software automatically. (*Thier* is changed to *Their* every time you type it.)

And it learns to recognize both the idiosyncratic mistakes you have a tendency to make, and the peculiar names, abbreviations, and spellings you don't want it to correct. If you override a correction, it adds the word or phrase to its exceptions list and never makes that change again. It has even learned to speak your language. If you have a question, you ask the Answer Wizard in plain English. "How do I make this into two columns?" It gives you step-by-step instructions. You stop working only long enough to type in your question.

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Benchmark Tests: Multiuser Accounting Software

CONTINUES

In testing Windows accounting software, we anticipated lackluster performance but were pleasantly surprised. Many accounting tasks aren't affected by a user interface, as most of the activity is at the database. The data entry tests showed that with the right hardware, most systems perform well.

What the Numbers Mean

There are similarities among the three top performers in this roundup: Pro Series, Scala for Windows, and WindowsPlus. Each vendor decided to maintain much of the existing source code and database technology from the character-based versions of its products and focus on providing an efficient if lackluster Windows interface. This approach makes for excellent speed, particularly for WindowsPlus, whose character-based software has been one of the best performers since we began performance testing in 1989.

The products that were total rewrites but had the most elaborate Windows interfaces didn't fare as well. Accounting Vision/32, Dynamics LAN, and Solomon IV for Windows finished in the middle of the pack, while Traverse finished near the bottom on most tests.

Pro Series did quite well, finishing second or third on most tests. Impact Encore struggled during the reporting tests but fared far better on the data entry and posting runs.

The testing approach was similar to that of previous years. We focused on the key accounting functions—reporting, posting, and data entry. We also used a test database similar to the one used in our 1993 testing, which consisted of the following: 6,489 GL accounts with 105,012 GL transactions; 3,000 vendors and 26,000 AP transactions; and 8,000 customers and 60,000 AR transactions.

Not surprisingly, these products require more powerful hardware than their DOS counterparts. To gain maximum performance, users will want to consider different factors. Dynamics LAN and Traverse, for example, will perform significantly better if most of the programs, work tables, and other temporary tables reside on the clients. Therefore, with these systems, client performance is key. Sometimes termed a *fat client*, your minimum configuration should be a 486DX2/66 processor with 12MB of RAM, but power users will want Pentiums with 16MB to 20MB of RAM.

For Solomon IV, server configuration is important. This *fat server* product should have a Pentium server with 16MB to 32MB of RAM beyond what is required by NetWare and your other applications to manage its Scalable SQL database environment effectively (a far cry from the 486DX/33 server with 16MB used in our 1993 roundup).

Solomon IV's SQL orientation looks to the server to be smarter about data access, returning only the data specified

and thereby reducing network traffic. This puts a bigger burden on the server, of course, and hence the requirement for increased server capacity. For most of the other products, standard Windows clients (minimum 486DX/50 with 8MB of RAM) and servers (minimum 486DX2/66 with 32MB of RAM) should suffice.

The **Standalone** and **Concurrent Reporting Degradation** tests consisted of printing five key reports, including a detailed AR customer aging, a customer list, a vendor list, a detailed GL trial balance, and a summary GL trial balance. For the Standalone Reporting test, we ran each report sequentially, while for the Concurrent Reporting Degradation test we ran all five reports together. We printed all reports to a test file.

Dynamics LAN, Pro Series, and WindowsPlus finished all reports in under 1 hour. WindowsPlus and Dynamics LAN completed the longest report, the detailed AR aging, in under 20 minutes—not bad when you consider that 60,000 AR transactions for 8,000 customers were reported.

Accounting Vision/32 took more than 3 hours, significantly laboring on the two longest reports, AR aging and detailed GL trial balance. Interestingly, Accounting Vision/32 uses the same record manager, Btrieve, as Dynamics LAN and WindowsPlus.

We conducted the Concurrent Reporting Degradation test to measure the amount of degradation incurred when all reports were run together. We weighted our results to account for the fact that the time to complete each report in the suite varies. The two fastest packages on the Standalone Reporting test (Dynamics LAN and WindowsPlus) fared worst on our Concurrent Reporting Degradation test.

You'll want to consider both standalone and concurrent times when evaluating overall performance. For example, WindowsPlus took twice as long to complete the summary trial balance on the concurrent test than on the standalone (the worst percentage of any vendor), yet it still had the third-best timing for that report.

For the **Data Entry** test, we simulated the input of five AP invoices with four lines of GL distribution each. We used Microsoft Test, computer-aided testing software for Windows applications, to enter the invoice data. We conducted tests on one, three, and six clients. We configured Microsoft Test to enter data as fast as the accounting software would accept it, thereby flooding the system with many more requests than one, three, or six users possibly could. Therefore, these tests simulate many more users than what we actually tested.

Unfortunately, because of incompatibilities between Microsoft Test and Impact Encore, Pro Series, and WindowsPlus, we were not able to automate these products without inserting artificial delays, which invalidates their test results. Therefore we did not include input times. Additionally, Traverse was unable to complete all the tests because of errors caused by contention problems.

Although we can't provide accurate numbers for Win-

dowsPlus or Impact Encore, from our observation, they probably would have placed no farther back than the middle of the pack and, in fact, may have had some of the quickest times. If you're considering these products and are concerned with data entry speed, we recommend that you scrutinize data entry speed during your software demonstration and, for a real-life test, visit other customers running the software.

Accounting Vision/32 and Scala had the fastest data entry times, and degradation for both was minimal. Solomon IV's input times were good, but we noticed significant degradation as we increased the number of clients. Dynamics LAN's input times were slower than most but showed little degradation as the number of clients increased. The three Btrieve products, Accounting Vision/32, Dynamics LAN, and Scala, saw the average per-user time decrease on the three-user test—an indication of the benefits of caching.

The **Posting** test measured the amount of time to post the AP invoices entered in the Data Entry test through to the GL. We also posted a set of cash-receipt transactions through to the GL. We measured actual posting time and time to print posting journals.

Dynamics LAN's posting process is worth noting. First, it automatically runs all posting routines in a background process, freeing up your screen to do other work. (But we still recorded the time to complete the posting.) Second, you can simultaneously post from multiple workstations and optionally post through to the GL in one posting process.

Scala and Pro Series posted the best times, both under 2 minutes. Traverse was particularly slow in posting the AR cash receipts, something its makers hope to correct in an upcoming version.

The **Financial Reporting** test consisted of printing a summarized balance sheet and a year-to-date income statement with three columns. Two columns listed specific department figures; the third included figures for the entire company. Scala was unable to print a single income statement in the format we required and instead printed two income statements (one with the total company numbers and one with the two-column departmental figures). We recorded the time required to print both income statements.

Scala and Solomon IV produced these reports very quickly, whereas most others showed merely respectable times.

It is becoming a common practice for vendors to look at third-party-developed Financial Report writers instead of investing precious development resources reinventing existing software. One of the most popular Financial Report writers, FRx, has become a staple for many character-based accounting systems, and three of the vendors in this roundup (Dynamics LAN, Solomon IV, and WindowsPlus) recommend it as their high-end Financial Report writer.

We've included the FRx reporting times for these vendors. Although it doesn't improve the already fast reporting times of WindowsPlus or Solomon IV, FRx is significantly faster than Dynamics LAN's standard Financial Report writer and should be considered if you purchase Dynamics LAN.

(Price Waterhouse does not validate the financial statements these systems provided.)

The Concurrency test was an untimed exercise in how these packages address multiuser locking and concurrency controls. A poor locking scheme can lead to either process delays if it's too rigid or data integrity problems if it's too lax.

To determine how the packages addressed locking, we had two users attempt to update the same customer record. Impact Encore, Pro Series, and Scala had the most rigid locking schemes. None will allow update access to a customer record that another user already has. The others allow multiple users to update access to the customer record and will even accept the changes made by the first user to save the record. Most of these packages require you to refresh your screen with the first user's updates and make your changes again. Dynamics LAN gives you an option to post over the other data, instead of reentering your changes.

We also looked at concurrency during posting and other key processes. Generally, the software packages provided adequate concurrency controls and didn't unnecessarily lock files or prohibit users from key activities. There were two notable exceptions, however. Impact Encore will halt posting of AR transactions if a user has a customer open in update mode. The posting will resume when the customer record is released. Scala will not allow any users to enter AP invoices while AP is posting a potential scheduling hassle for larger companies. Results of the Concurrency test are not quantitative and are therefore not shown here.

Finally, we conducted the **Fault Tolerance** test, which examined how the packages reacted when we powered off the client during a posting. In the past, this hasn't been a pretty sight with most packages, resulting in data corruption and requiring restoration from a backup. But we found that the packages are getting better at minimizing the risk of data corruption. Most are using some sort of transaction tracking (monitoring processes to ensure the transactions are fully complete, and roll back to their original state if they aren't), which to be effective must be jointly controlled by the application and the database.

Accounting Vision/32, Pro Series, Solomon IV, and WindowsPlus were able to complete the Fault Tolerance test successfully. In each instance, we were able to restart and complete the posting immediately.

With Dynamics LAN, we had to perform a couple of steps, including running a utility program, before being able to repost. Great Plains indicated that a cleaner fault-tolerance solution will be available in the next version.

Three systems—Impact Encore, Scala, and Traverse—made a poor showing. Data was corrupted in each case and required either an extensive reconciliation process to determine where exactly the posting halted or a restore from backup. Results of our Fault Tolerance test are not quantitative and are therefore not shown here.

—Analysis written by Thomas White; technical guidance provided by Troy Yoner

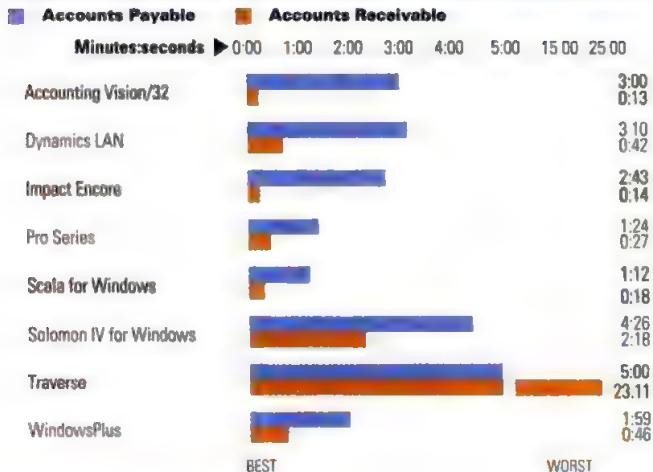
STANDALONE REPORTING



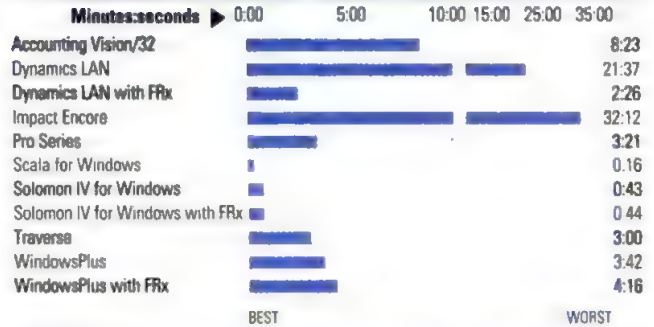
CONCURRENT REPORTING DEGRADATION



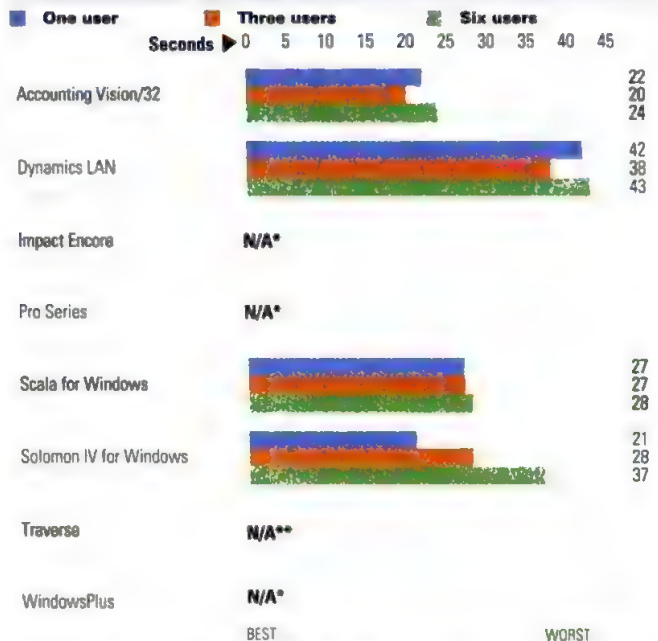
POSTING TIMES



FINANCIAL REPORTING



DATA ENTRY



N/A* —Not applicable. The program was incompatible with the Microsoft Test

N/A** —Not applicable. The program was not able to complete all the tests because of errors caused by contention

How We Tested

Our test-bed configuration consisted of seven Compaq Deskpro 486/66 systems, each with 16MB of RAM and a 320MB disk, and an HP NetServer LF 5/66 file server with 128MB of RAM and 4GB of disk space. The primary disk on the file server was striped for maximum performance. We used NE2000 network cards for the clients and an NE3200 for the server on our 10Base-T network. The network operating system was NetWare 3.12, and the clients ran Microsoft Windows for Workgroups 3.11 and DOS 6.22.

We provided each vendor with a test database to be converted into the package's data-file format. The test database consisted of 105,012 detailed GL transactions, 6,489 GL accounts, 3,000 vendors, 26,000 AP transactions, 8,000 customers, and 60,000 AR transactions. Vendor representatives were invited to optimize the network as desired, but no hardware or third-party software could be installed. Vendor reps were present for all tests conducted on their software.

We ran each test at least twice to ensure consistency, and the clients and server were returned to a clean state before each test.

We conducted five performance tests, each simulating a common accounting task. The **Standalone Reporting** test measured the time required to print

five reports: detailed AR aging, customer list, vendor list, detailed GL trial balance, and summary GL trial balance. The **Concurrent Reporting Degradation** test showed the degradation in printing time when reports were run concurrently. Reports were printed to spool files to prevent printer performance from affecting times.

The **Posting Times** test measured the time to post the invoices entered in the Data Entry test and 15 AR cash-receipt transactions. We timed the steps necessary (posting and printing) to post the transactions through to the GL.

The **Financial Reporting** test measured the time to print a summary balance sheet and a year-to-date departmental income statement.

The **Data Entry** test simulated the entry of AP invoices. We entered five invoices with four lines of distribution: first on a single client, then on three clients, and finally on six.

We also conducted untimed tests to measure multiuser concurrency and fault tolerance. We examined multiuser concurrency by testing such instances as: two users attempting simultaneously to modify the same customer record and attempting to add AP vendors during posting of AP invoices. On our Fault Tolerance test, we powered off the workstation during the posting of Accounts Payable invoices.

NetBIOS-compatible network, or a Unix server. You can use Btrieve or Level II COBOL file formats. In addition, Encore client PCs can be either Windows or character-mode, and both clients can simultaneously access the same database.

Many will find Encore's ability to attach images, sound, or video clips to master-file records an impressive—but not very practical—feature, at least for the foreseeable future. Syspro Impact believes that as imaging and other multimedia technologies become more prevalent, however, the benefit of scanning source documents, such as invoices or engineering drawings, and attaching them to appropriate records within Encore will give the program a significant advantage over its rivals.

Although Encore lacks some standard Windows features, the great depth of accounting features and the suite of modules make it well suited for manufacturing and distribution businesses. If you're more concerned with accounting functionality than all the latest graphical interface features, this may be a good introductory Windows package.

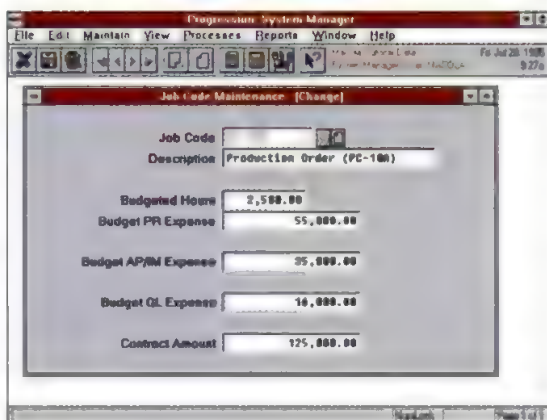
Macola Software

Progression Series, WindowsPlus Solutions

BY COLLETTE CLELLAND AND
STEPHEN HERLICK

The latest in the evolution of Macola's Progression Series is WindowsPlus, which upholds the tradition of fast performance and solid features characteristic of this product line. New Bank Book and Currency Manager modules, and new reporting and development tools, make the product even more attractive. It's only real shortcoming is that the usability of its new Windows interface falls short of several others in this roundup.

The basic WindowsPlus modules include GL, AP, and AR (\$995 each); there is also a System Manager (\$4,995). Macola plans to release distribution and manufacturing modules late this year and early next year, respectively. But Version 6.0 modules can't be used with Version 7.0 modules.



You can set up jobs within Macola's WindowsPlus Solutions and track actual costs versus the budget amounts set up on this screen.

ACCOUNTING FOR THE WINDOWS

Windows presentation features, such as the ability to size screens and tile or cascade windows, are welcome additions in WindowsPlus. Switching between screens is faster with this product than with most others we reviewed, and, except for a couple of key screens, the system provides MDI.

On the other hand, navigating during data entry is awkward in places. For example, when you move from the header to the distribution screen as you're entering an invoice, you can't return to edit the header screen without saving and closing the distribution screen and reselecting the invoice entry option from the menu bar. In addition, the PgUp and PgDn keys don't always work when they should, but you can click on the corresponding icons to move to the next or previous screen.

On report selection screens, unless you choose the Default option, you must Tab through all fields before you can begin printing your report. When you print a report to screen, you can't jump to any other function in that module until you close the report window.

Macola has retained its 15-digit, three-segment GL account structure from previous Progression versions. But now you can optionally assign a separate fiscal calendar to each subledger—beneficial for organizations with different cutoff periods. The product's automatic calculation of many financial ratios (for example, current ratio, receivables turn, and debt-to-equity) is a useful information management tool.

Job numbers have been added through-

out the system so that users can easily track job costs generated in the subledgers or in the GL directly. And job-cost reporting is provided in the System Manager module.

INQUIRING ACCOUNTS WANT TO KNOW

In AP, user-defined auto-distributions facilitate the allocation of costs, such as splitting rent between departments. A useful AR feature is the ability to generate service invoices and track the related profitability. Through Macola's AR module, users have up-to-the-minute reports and graphs of commission due, sales analysis, tax analysis, cash projections, projections—and more—at their fingertips.

The on-line inquiry facility can give you a tremendous amount of detail. It lets you drill down from any transaction in the GL to the originating document in AP or AR. But the ability to start the drill-down process from account-balance information, instead of just at the detail transaction level, would be a welcome improvement.

The standard reporting facility found in all the modules is quite extensive, and Macola has retained the feature that allows you to specify the date or time you want the report to be printed. Further, when

▶ FACT FILE

Progression Series, Version 7.0, WindowsPlus Solutions

List price (2 to 5 users): Accounts Payable module, \$995; Accounts Receivable module, \$995; General Ledger module, \$995; System Manager module (and F9-The Financial Report writer and Enterprise Reporting System), \$4,995. **Requires:** Server: LAN Manager, LANtastic, NetBIOS, NetWare, Microsoft Windows NT, Windows for Workgroups. Workstation: 486/66 processor, 8MB RAM, Windows 3.x. **In short:** Macola's Progression Series, Version 7.0, WindowsPlus Solutions sports new development tools, foreign-currency capabilities, and improved cash management functionality. It continues to be one of the faster products on our performance tests, yet its Windows interface is awkward in places.

Macola Software, 333 East Center St., Marion, OH 43302, 800-468-0834, 614-382-5994, fax, 612-382-0239

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SUITABILITY TO TASK

	Power	Ease
Financial accounting	Good	Good
Customization	Excellent	Good
Reporting	Good	Good
Auditing and securing data	Excellent	Good

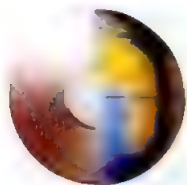
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Late Out of the Gate

By Thomas White

Not all of the preeminent LAN-based accounting software vendors had actually released new Windows-based versions of their products by our testing cutoff date. Here, we briefly look at accounting products from two well-established vendors that should be available (at least in part) by the time you read this.

CYMA^{IV}/ACCOUNTING FOR WINDOWS

The long-time accounting- and health care-software provider, CYMA Systems (800-303-2962), will be releasing a full suite of Windows-based applications called CYMA^{IV}/Accounting for Windows. The first two modules, System Manager and Accounts Payable, should be available by the time you read this.

CYMA plans to roll out the general ledger (GL) and accounts receivable modules by the first half of 1996. Inventory, Sales Order, Purchase Order, Client Accounting, Bank Reconciliation, Payroll, and Job Control will be released subsequently.

Ensuring continued support for its existing customer base, CYMA^{IV} modules can be run concurrently with the existing character-based product, PAS+. By running a CYMA^{IV} utility, PAS+ customers can convert AP files

to the CYMA^{IV} format yet still integrate AP data with their existing GL.

Written in C++, CYMA^{IV} is technologically a quantum leap forward from the CPM/86 Basic code used to develop PAS. Also, CYMA^{IV} should be able to support companies with larger volumes of data because it uses the Btrieve database instead of the text files it used to use to house PAS data.

CYMA^{IV} has a clean, uncluttered desktop that all but the novice Windows user should find intuitive. data entry screens have clearly identified lookup fields, and the columns on the data entry grids can be resized to your preference. A clever on-line help system displays an image of the CYMA^{IV} screen; you point anywhere to receive help text on that section or field.

Like the screens themselves, the accounts payable module features are basic. You won't find high-end features such as multicurrency, recurring vouchers, or automatic allocations, but CYMA^{IV} does support multiple bank accounts, multiple AP ledgers, and various payment terms and discount levels.

A handy Quick Pay feature lets you enter an invoice and cut a check in one process. CYMA^{IV} also integrates a

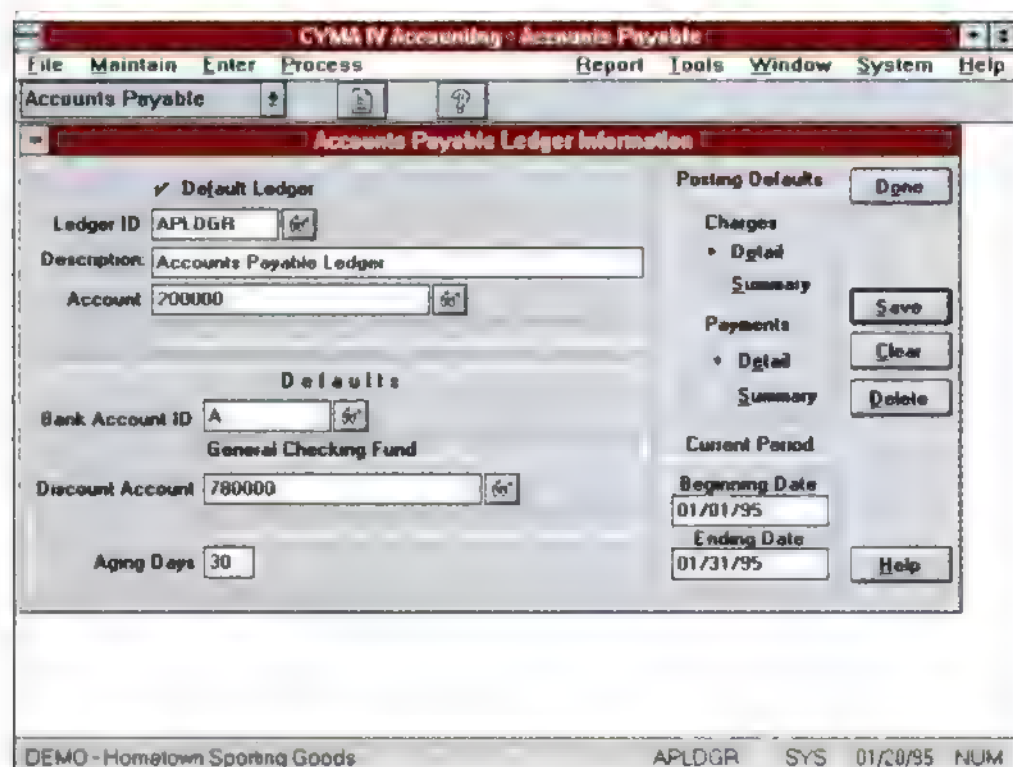
runtime version of Crystal Report Writer to handle all your report-writing tasks. Over 30 reports are included in the AP module alone, each with an abundance of selection parameters. If you can't find what you're looking for here, you can purchase a full-use version of Crystal Report Writer and create the report yourself.

From what we've seen so far, CYMA^{IV} promises to be an excellent upgrade for PAS+ users and a good choice for companies with relatively straightforward accounting requirements.

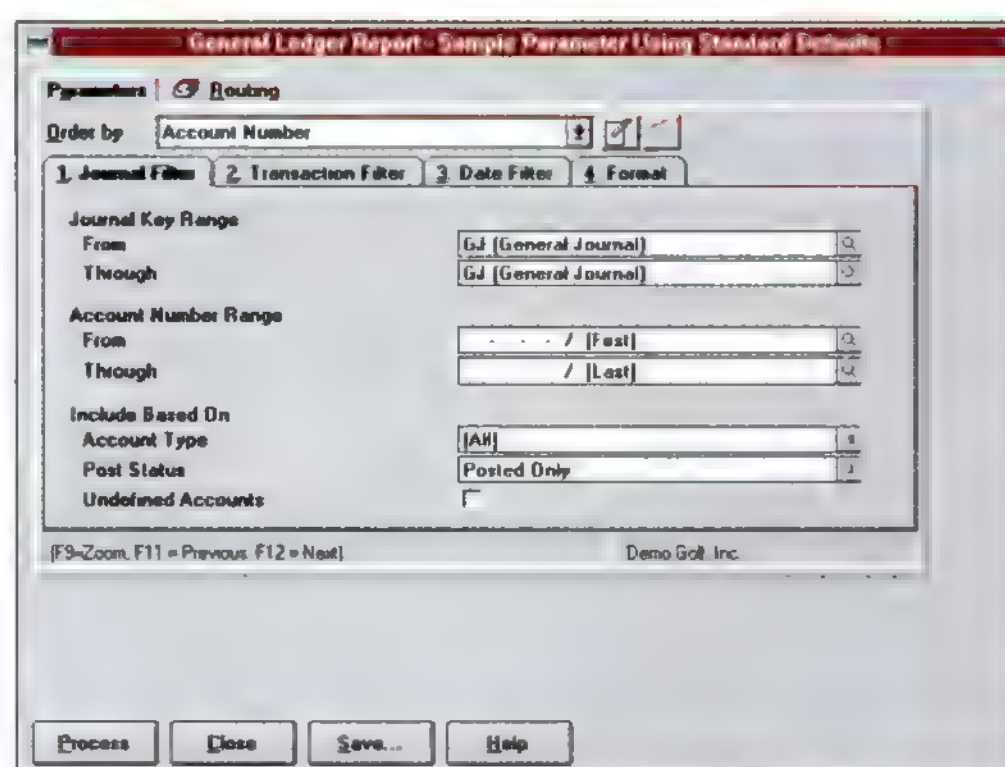
PLATINUM FOR WINDOWS

As an Editors' Choice in our last review of high-end LAN accounting software, expectations for Platinum Software's (800-426-0469) new Platinum for Windows are high. Sporting the same functionality as its DOS predecessor and now with the addition of impressive new technologies, Platinum for Windows shouldn't disappoint.

Platinum for Windows is based on a three-tier architecture: client, network file server, and application server. Though its competitors use two tiers, Platinum for Windows uses one or more application servers to run accounting processes such as postings or reports.



The Queue Manager screen displays reports and postings sent to the application server for processing.



Tabs are used extensively throughout Platinum for Windows, as illustrated in this GL report screen.

A queue manager resides on the file server, and its sole responsibility is managing processes sent to the application servers. When a user runs a long report, for example, the process is automatically sent to the application server, freeing up the user's PC. And when the process is complete, the queue manager notifies the user that the job is done. You won't have to spend a lot of money on application-server hardware; it doesn't require more than 640K of RAM and needs no disk space, and an average 486 processor should satisfy most performance needs.

Platinum for Windows and current Platinum for DOS modules are fully interoperable. But DOS users won't be able to offload processes to the application servers.

By the time you read this, the Premier General Ledger, Standard General Ledger, Currency Manager, Currency Translations, Consolidations, and Intercompany and Bank Book modules should all be available. Accounts Payable and Accounts Receivable should ship by the end of 1995, followed closely by more modules, including Order Processing, Purchasing, and Inventory.

With its document and tab orientation, Platinum for Windows has a Windows 95 look and feel. Its desktop has a tab for each module and displays a list of menu choices for the current tab. Icons are available on the toolbar to limit menu choices to just maintenance, reports, or posting options.

Like the DOS version, Platinum for Windows Premier Ledger has comprehensive, high-end features, including a fully configurable 32-digit account number, powerful multicurrency and consolidation functions, and flexible report writing.

Although late on the scene, Platinum for Windows has the potential to become a leader in the LAN-based Windows accounting market. The strong reputation of its earlier versions precedes it.



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supports all the advanced user interface features provided by the Windows 95 common controls. It also provides Windows Sockets classes for writing protocol-independent, communications-based applications.

PORT.EXE AND THINKING

If your 16-bit code avoids class libraries or is littered with 16-bit keywords like *near* or *far*, porting that code to 32 bits will be more difficult. In such a situation, PORT.EXE is a helpful tool. This Microsoft application,

which is included in the Win32 SDK and in Microsoft Visual C++ 2.1, scans your source code and alerts you to any potential porting problems.

Migrating a 16-bit program to Windows 95 can also be a problem when you use third-party DLLs to access databases or hardware devices. If the provider of these DLLs has not updated the code to a 32-bit environment, you will have to switch to a new 32-bit library or write thunks between your 32-bit code and the 16-bit DLL. Although 16- to 32-bit thunk-

ing is always messy and complex, it is smoother under Windows 95 than under Windows NT.

Writing thunks requires a 16-bit compiler, a 32-bit compiler, and an assembler like Microsoft's MASM or Borland's TASM. Under Windows 95, thunks also require a third compiler, which comes with the Win32 SDK.

VIRTUAL DEVICE DRIVERS

If your current application uses a DOS device driver to communicate with hardware com-

POLISHING STRONG WINDOWS 95 SUPPORT

Symantec C++ 7.2

By Richard V. Dragan

By the time you read this, Symantec will have shipped Symantec C++ 7.2, a Windows 95-ready interim release of its already-strong C++ offering. This release supersedes Version 7.0, which already includes support for important Windows 95 features such as long filenames and makes good use of Windows 95 user-interface conventions.

The new release will bring further improvements to the user interface, as well as to the final Windows 95 header, library, and sample files. It will also include MFC 3.2, which adds support for the Windows 95 common controls and socket classes.

With Version 7.0, Symantec lets you design a hierarchy of classes visually using its Class Editor. This lets you treat your C++ code as a group of classes, not a maze of source files. Through the use of background parsing of source files, Symantec C++ even lets you browse classes before you compile them, a revolutionary step forward in C++ programming.

Since Version 7.0, the Symantec integrated development and debugging environment (IDDE) itself looks like a Windows 95 application. The newer 7.2 release handles screen metric changes better and will intelligently stay out of the way of the Windows 95 taskbar. Unlike most of its rivals, Symantec C++ eschews the Multiple-Document Interface (MDI) for its IDDE in favor of a floating toolbox-based interface, where sets of windows can be moved all over the desktop. You may have noticed that titlebars are smaller under Windows 95. The Symantec C++ interface also lets you take advantage of this extra

screen real estate. Especially at higher screen resolutions, Symantec 7.0 really shows off the Windows 95 desktop to good effect.

The new release not only includes licensed versions of MFC from Microsoft, but also offers excellent compatibility

to target both 16-bit and 32-bit Windows MFC applications using the same toolset. This feature will grow less important as the world migrates over to 32-bit Windows during the next few years, but for now, it may be decisive for some Windows 3.x projects.

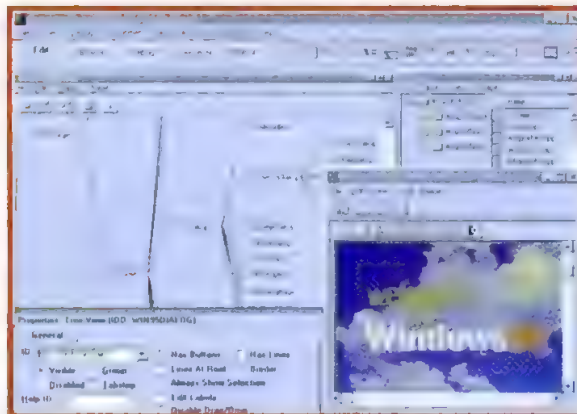
Naturally, there are new classes to manage in MFC 3.2. In the Symantec C++ 7.2 resource editor, the Resource Studio, you can add those fancy Windows 95 user-interface enhancements like Tree View, List View, Progress, and Spin Button controls to dialog boxes just as easily as you can add the standard Windows controls. Class-Express has also been enhanced to support the new custom control classes, and it helps you in navigating the dozens of new messages and events that go along with these new classes.

The compiler underpinnings to Symantec C++ include multi-threaded compilation under Windows 95, the powerful

Optlink linker, and the industrial-strength MultiScope debugger, which offers full graphical debugging under both 16-bit and 32-bit environments. Another tool, NetBuild, lets you distribute large builds across multiple networked systems for faster build times. (NetBuild can also take advantage of peer-to-peer networking in Windows 95.) With its new support for MFC 3.2 and enhancements to the user interface, this interim release adds an excellent set of Windows 95-certified tools to an already-powerful C++ product.

Symantec C++ 7.2. Estimated street price: \$199. Symantec Corp., Cupertino, CA; 408-253-9600.

Circle 473 on reader service card



CLASS EDITOR: Symantec C++ 7.2 displays classes in a visual hierarchy, letting you browse and edit them without first having to run an editor-free compile.

with Microsoft Visual C++ code (you can even generate Code View-compatible debug files). Symantec C++ also offers its own version of Microsoft wizards, which let you automatically generate a default application and then customize MFC code with new classes and message handlers as you build your programs. Symantec calls its wizards by its own names. While Visual C++ has the AppWizard, Symantec's tool is the AppExpress. The ClassExpress tool is Symantec's counterpart to Visual C++'s ClassWizard. ProjectExpress is another tool to manage targets, which can include DOS and both 16- and 32-bit Windows.

One feature that sets Symantec C++ apart from its Microsoft rival is its ability

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you print a report to the screen, Windows-Plus lets you resize the font so you can display the entire width of the report. There is also a full-text search function.

Macola's actual Financial Report writer is beginning to show its age, however. Though fine for basic financial reports, it's cumbersome for companies with complex reporting hierarchies. Macola has bundled (and integrated) the third-party product F9-The Financial Report Writer to handle more complex structures, and offers FRx as an extra-cost option (see the sidebar "Report-Writer Report").

For custom reports, Macola offers the new Enterprise Reporting System (ERS), Version 3.0; it's included in the System Manager. ERS allows lets users to create reports in either scripted or graphical mode in a few simple steps. ERS also generates full SQL code, which you can access in case you can't produce an unusually complex report through normal means. Or you can always use one of the popular third-party report writers, like Crystal Reports.

CUSTOM MADE

Businesses with special needs should take a look at Designer, Macola's new customization tool, which comes in End-User and Developer forms. The End-User version, a component of the System Manager, lets you easily modify screens, reports, and forms. The Developer version, intended for experienced programmers, is available (at extra cost) only to customers who purchase Macola source code.

Macola's new \$995 Bank Book module is the focal point for all cash-related transactions. It helps with bank reconciliations, tracking bank deposits, and cash-flow reporting. The \$2,195 Currency Manager module, also new, isn't fully FASB 52-compliant but does provide for calculation of unrealized gains or losses in the subledgers. Although the GL is kept in the home currency, the AP and AR subledgers maintain both home and native values.

As in years past, Macola was one of the

fastest on our performance tests (see "Benchmark Tests"). This reflects the importance Macola has placed on performance and on its stable architecture that has been fine-tuned over the years.

SBT has an innovative program that helps its customers do business over the Internet.

Macola's product line has a long and stable history, speedy performance, and a strong features set. The WindowsPlus version does have some Windows-related quirks, however, that shouldn't keep

you from seriously considering this product for your accounting needs.

SBT Accounting Systems Pro Series 3.01i

BY ROBERT MACWHIRTER

Since our 1993 roundup, all has changed for SBT Accounting Systems' Pro Series. SBT has added numerous accounting features, converted to Windows, and offered an innovative program that helps its customers do business over the Internet. Consequently, Version 3.01i (\$895 per module) marks a significant step forward for this FoxPro-based accounting system.

Unfortunately, one of the program's traditional strengths (its use of Microsoft's FoxPro for Windows as a foundation) has become its Achilles' heel. Because of FoxPro's limitations, Pro Series can't provide some basic Windows features—notably, MDI and screen resizing. But SBT has committed to converting its applications to Visual FoxPro soon after its release, and this should definitely improve the product's interface.

If gradually converting to a Windows accounting system is what you want, Pro Series supports simultaneous access by character-based users and Windows users. The product did well on our Windows-based performance tests, but to get the same results we did, you'll need to be sure your Windows computers have at least 12MB of RAM.

CASTING A WIDE NET

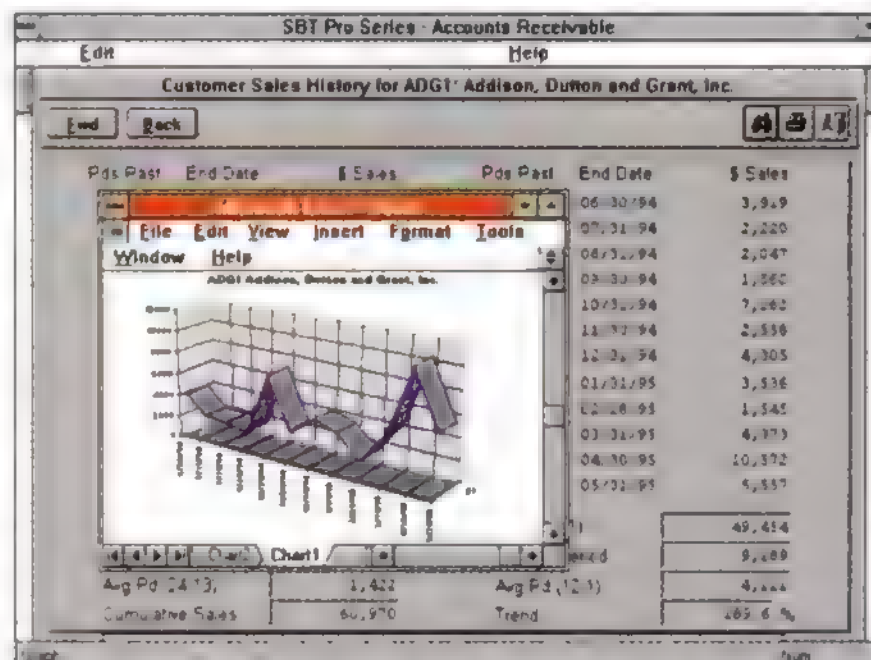
SBT is the first high-end LAN accounting vendor to give its customers tools to conduct business over the Internet. The WebTrader module (\$1,295) includes templates for you to set up a World-Wide Web storefront. Customers who have access to your Web site can browse catalogs, learn more about your company, receive technical support, and, most importantly, place orders.

WebTrader captures customer-order information, encrypts the data, and electronically transfers it into your Pro Series order-entry system as a bid. And a confirmation notice is automatically transmitted to the customer via Internet e-mail. If, however, you don't want to set up your own Web site, SBT will lease a home page address and 10MB of disk space on its server (WebStreet, \$395 per year) to get you started.

TRACKING THE TRAIL

One slight drawback of this version of Pro Series is that it's not yet ready for international organizations. It lacks multicurrency capability, multilanguage support, and complex tax reporting. Although the product has basic U.S.-specific taxes (state, county, and city), tax tables, and minimum VAT capabilities, it doesn't support tax-on-tax calculations or provide individual tax-authority tracking reports.

Pro Series is designed for real-time AR and AP invoice entry. Groups of invoices entered at the same time are tracked by user session number. The session number also forms part of the audit trail and can be traced back to the source



SBT's Pro Series uses a DDE link to allow quick generation of summary graphs, such as a customer's sales history.

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ponents, it's probably a good idea to rewrite the driver as a VxD (virtual device driver). Windows 95 does support DOS drivers, but applications that use them are at a severe disadvantage. Not only are VxDs faster, but they can be dynamically loaded and do not reside in low memory.

In the past, writing VxDs was best left to the black arts of assembler code experts. The introduction of two new tools, however, makes it relatively easy to create virtual device drivers with a 32-bit C/C++ compiler

and debugging tools. The Windows 95 Device Driver Kit contains C-style wrappers for the common VxD functions, while Vireo Software's VtoolsD 1.1 provides support via a third-party toolkit.

OLE AND OXC CONTROLS

Microsoft has long been pushing OLE 2.0 as the object-oriented interface for both Windows NT and Windows 95. OLE Custom Controls (OCXs) are the containers by which OLE objects will be made available to application

programs. At their core, OCXs are simply DLLs with a predefined interface. At Microsoft, OLE was developed under the Windows NT umbrella, so Windows 95 doesn't really introduce anything substantially new for OLE development.

If you simply want to use prewritten OCXs, they are supported by Borland C++ 5.0 and Microsoft Visual C++ 4.0. If you want to create your own OCXs, both MFC and OWL contain built-in support for getting basic OCXs up and running.

IMPROVING ON EXEMPLARY CROSS-PLATFORM SUPPORT

Watcom C/C++ 10.5

By Richard V. Dragan

The chief strength of Watcom's C/C++ compiler has always been its ability to target myriad operating systems, including 16- and 32-bit Windows, OS/2, NetWare NLMs, and DOS. The beta release of Watcom C/C++ 10.5 provides even more impressive cross-platform support with the addition of a Windows 95 IDE. It also provides automatic MFC-code generation via Blue Sky Software Corp.'s Visual Programmer. It does not, however, include MFC 3.2, which supplies direct access to Windows 95 command controls and Windows Sockets (Winsock).

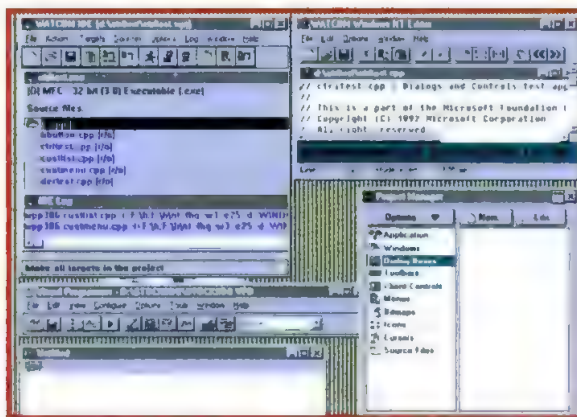
OS INDEPENDENCE

The Watcom compiler uses a set of core routines that are operating-system independent, which ensures consistent code generation on all platforms. Regardless of the platform that you are using, there is always access to all C++-language features, including templates, exception handling, and runtime type information (RTTI).

Under each operating system, the Watcom C/C++ 10.5 IDE takes on the same general appearance. Its new Windows 95 IDE does support long filenames, but it eschews all other Windows 95 user-interface enhancements in favor of the familiar Watcom interface. This host lacks the look and feel of ordinary Windows 95 applications, but it offers more target options than any other Windows 95-hosted compiler.

Version 10.5 can also integrate with several version-control packages, including Intersolv's PVCS. Within the IDE, compiler and linker switches let you

change target options and optimizations, and an MDI (Multiple-Document Interface) editor lets you edit source code and save it using long filenames. If this editor does not suit your needs, however, you can easily substitute a third-party editor and various other tools.



NEW WINDOWS 95 IDE: Watcom C/C++ 10.5 has added to its impressive cross-platform support, which includes OS/2, NetWare, Windows 3.1, and Windows NT targets.

Prior to Version 10.5, Watcom C/C++ did not provide wizards or experts for automated code generation and simplification of MFC programming. The new version bucks this trend by bundling Blue Sky's Visual Programmer, Version 2.02. This useful CASE tool lets you visually design Windows applications and then automatically generate the corresponding source code. Visual Programmer writes code from your functioning prototype via Switch-It Modules (SIMs) that support MFC 3.0 (for 32 bits) and MFC 2.5 (for 16 bits).

Consequently, Visual Programmer can use the same visual design to generate working MFC code for both 16 and 32 bits. Blue Sky's CASE automation even lets you

customize MFC source code without interfering with a program's visual prototype. (This is possible, because user-customized classes and automatically generated classes are identified by different file extensions.) Visual Programmer will not substitute for wizard-based management of C++ code, nor will it automatically build OLE 2.0 applications. But it can still be a useful development tool.

For developing 32-bit Windows 95 applications, Watcom C/C++ 10.5 will ship with the latest Windows 95 header and library files. Using these files, developers will be able to work with the Windows 95 common controls, Winsock, and other API enhancements. If you want this functionality with C++, however, you will have to wait for the updated version of MFC. Watcom's licensed version of MFC 3.0 does not include direct Windows 95 access, but Watcom will upgrade to MFC 3.2 sometime after the release of Windows 95 itself.

Watcom C/C++ 10.5 should be available by the time you read this review, and all registered users of Version 10.1 will receive a free copy. This interim release brings programmers to the world of Windows 95 quite smoothly and continues Watcom's tradition of offering powerful cross-platform tools and strong C++ language support. These tools now work with Microsoft's newest operating system, but more detailed support for Windows 95 will not be available until later in 1995.

Watcom C/C++ 10.5. List price: \$350; competitive upgrade, \$199. Watcom International Corp., Waterloo, Ontario, Canada; 800-265-4555.

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SUMMARY OF FEATURES

Multiuser Accounting Software

Ends

■ YES ■ NO

PC MAGAZINE
EDITORS' CHOICE

PC MAGAZINE
EDITORS' CHOICE

Products listed in alphabetical order

	AV/32	Dynamics LAN	Impact Escero	Pro Series	Scala	Solomon	Traverse	WindowsPlus
Accounts Receivable								
Customer-number length	10	15	7	8	10	10	10	12
Maximum number of ship-to locations per customer	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited
Creates parent customer for reporting purposes	■	■	■	■	■	■	■	■
Checks for duplicate cash receipts	■	■	■	■	■	■	■	■
Processes cash receipts for multiple cash accounts	■	■	■	■	■	■	■	■
Receives cash on account	■	■	■	■	■	■	■	■
Allows date-triggered recurring invoices	■	■	■	■	■	■	■	■
Writes off small customer-balance discrepancies	■	■	■	■	■	■	■	■
Prints detailed deposit slips for cash received	■	■	■	■	■	■	■	■
Commissions based on gross profit	■	■	■ ²	■ ²	■	■	■	■
Commissions based on payments received	■	■	■ ²	■ ²	■	■	■	■
Multicurrency transactions	■	■	■	■	■	■	■	■
Credits check by balance/days overdue	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Module reports:								
Sales analysis by customer class	■	■	■	■	■	■	■	■
Finance charge	■	■	■	■	■	■	■	■
Cash forecast by due date/average pay date	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Cash discounts taken	■	■	■	■	■	■	■	■

² This feature is included with the Sales Order module.

using the GL drill-down feature. Authorized users can now print the details they need from any stage of their drill-down investigation.

A unique AP feature handles credit card payments: An invoice may be processed as a credit card payment, allowing liability to be transferred to a credit card vendor while preserving the purchase history and statistics for the original supplier.

THE FORMS HAVE IT

To create business forms, Pro Series includes the FoxPro Report Writer. You can incorporate multiple fonts and company logos into invoices, order forms, and checks, and print them via Windows. Standard system reports use the Pro Series print engine for performance and better control over report output. Users can view (with an option to save to file), print, or export the report to ASCII-delimited, Microsoft Excel, or Lotus 1-2-3 formats.

The standard financial-reporting tool will let you report on any user-defined account segment. More advanced reporting requires that a custom report be developed in FoxPro or a third-party Windows reporting tool.

SMOOTH INTEGRATOR

Pro Series integrates well with other Windows applications. Customer and vendor history may be automatically graphed

with Excel. In addition, you can create personalized marketing and dunning letters using the mail-merge feature, with integration directly to Word or WordPerfect for Windows.

For those who are interested in modifying their software to meet specific business needs, SBT long has been a favorite. SBT strongly recommends, however, that you seek expert advice before significantly customizing the product. In addition to making changes to its FoxPro source code, Pro Series will also allow less-involved changes, such as modifying data dictionaries and creating business rules, that can be made without touching a line of code. One nice addition would be the ability to tailor data entry screens without having to dive into FoxPro.

The File Browse utility is extremely handy for viewing your accounting data. The software comes with standard views, but system administrators can set up new views by user, including specific filters so you can protect confidential data. Because it's presented in an easy-to-use spreadsheet format, users can sort, filter, and search data as desired.

Pro Series' user manuals and on-line

▶ FACT FILE

Pro Series 3.0i

List price (5 users): Accounts Payable module, \$895; Accounts Receivable module, \$895; Financial Report writer, \$895; General Ledger module, \$895; System Manager module, \$895. **Requires:** Server: LAN Manager, LANtastic, NetBIOS, NetWare, OS/2, Microsoft Windows NT. Workstation: 486 processor, 8MB RAM, Windows 3.1. **In short:** Effective on-line inquiry, easy integration with other Windows products, and an innovative tool to conduct business on the Internet highlight SBT's Pro Series 3.0i. A significant improvement in the Windows interface should be realized with the next version of FoxPro.

SBT Accounting Systems, 1401 Los Gatos Dr., San Rafael, CA 94903; 800-944-1000; 415-444-9900; fax: 415-444-9901.

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Dell's featured digital artist is Sanjay Kothari of New York, NY



help are thorough and well written. Both the on-line and hard-copy help often go beyond merely describing a feature to discussing the impact a choice will have on other areas of your accounting system. A handy Pro Series Help feature is the ability to perform a full-text search in order to locate a keyword or phrase quickly.

As for security features, Pro Series provides encrypted user IDs, names, and passwords, with access defined for each process. With Pro Series, you can even set up date- or time-dependent user privileges; so, for example, your AP clerk can enter invoices only from 8:00 to 5:00. In addition, Pro Series allows you to track login sessions, master-file changes, and processes run.

For a small to medium-size business, SBT's Pro Series 3.01i is an excellent choice. Its WebTrader module offers companies that are interested in doing business on the Internet a viable start-up option. Experienced Windows users may not love the less-than-stellar Windows interface, however.

Scala USA Inc.

Scala for Windows

BY SANDRA SAPONARA

If your business needs support for strong multicurrency accounting and a full suite of accounting, materials management, and manufacturing modules, you may want to let the still-crude Windows interface of Scala for Windows, Version 3.1.5, from Scala USA, Inc., take a back seat to its outstanding functionality. Scala for Windows is based on Scala's character-based product, which was developed in Sweden, is used in over 80 countries, and consists of 17 integrated modules, including manufacturing.

Released in late 1994, Scala's first GUI modules (General Ledger, Accounts Payable, and Accounts Receivable) can coexist on the same LAN with their character-based counterparts. The good news is that existing Scala users are supported, so they can ease into the Windows environment. In fact, most Scala For Windows screens let you use the same keystrokes as the DOS version. The bad news is that the

interface lacks many standard Windows functions, most notably MDI, which means you can only open only one window at a time. And Scala For Windows still uses a numbered menuing system to navigate through the system.

The standard Windows pull-down menus are included with Scala for Windows, and its tool bar can be configured to include print spool, language, help, and external program icons. The tool bar is handy for users who want to launch a spreadsheet, report writer, or e-mail while working in Scala; but icons for application-related functions aren't available yet. You can, however, tailor menus by user, and each one can be password protected.

ACCOUNT DIMENSIONS

Each GL account number is allowed up to four segments (main, cost, product, and project code) of up to six characters each. (Scala's next release will offer more segments and also will allow you to rename them.) Five budgets can be maintained for each account, and statistical accounts can be configured to track non-

Report-Writer Report

By Thomas White

The accounting systems featured in this evaluation do a good job of presenting accounting information in standard reporting formats for analysis and decision making, but these days, companies are increasingly finding that they need more flexibility in their reporting.

Enter third-party report writers. These tools enable you to transform raw data into valuable information that can transform an average accounting system into an outstanding one.

We looked at four leading report writers recommended by the accounting software vendors whose products we reviewed here. Crystal Reports and R&R Report Writer are considered general report writers because they can access all data files in your accounting database, whereas the other two, FRx and F9, focus on financial reporting only and, therefore, are limited to General Ledger

data files. So picking the right tool for the job is important; a complex financial report is much easier to produce with FRx or F9 than with Crystal or R&R.

THE GENERALS

Crystal Reports, from Crystal (800-877-2340), is a powerful general-purpose tool that comes in two versions, Professional and Standard. The former is a must if you need access to SQL-oriented databases, such as Oracle, Scalable SQL, and Sybase.

Crystal's Expert feature walks you through report creation. After you select the tables and files to include, Crystal displays the tables and all possible links between them. Simply connect the links you need, select the fields you want, define filters you want to apply, and you've got your report.

Accountants will love Crystal's ability to drill down on summary

reports to analyze details. Its built-in graphing utility lets you insert graphs directly into your report. And all Crystal reports can be printed, exported, or sent via e-mail.

The other recommended general purpose report writer, R&R Report Writer, from Concentric Data Systems (800-325-9035), initially gained popularity in the Xbase world, but most accounting users will want to look at their SQL Edition, which can access Btrieve and all leading SQL databases. (Solomon IV for Windows uses the interactive version of R&R for its standard reports.)

R&R has been certified as Microsoft Office-compatible, so Office users will find its look and feel familiar, even down to the Wizards. Like Crystal, R&R walks you through report creation and gives you numerous formatting options, including box- and line-drawing tools. You can also insert bitmap images (like logos) into



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CIRCLE 129 ON READER SERVICE CARD

PLOTTING A COURSE TO WIN32

Even if you need to support 16-bit Windows legacy code for the time being, it makes sense to begin plotting a course to the Win32 API. Microsoft's claim of a common Win32 API on both the Windows NT and Windows 95 plat-

forms is not literally true, but it appears more credible than ever with the Windows common controls now supported on Windows NT.

Today, we are clearly in a transition period as the major tools beef up support for Microsoft's newest operating system releases.

A number of important new releases are slated to appear by the end of the year, so you should enjoy strong support from your tool of choice in the near future. In this story's product summaries, we give you a snapshot of each vendor's path to Windows 95. □

SIMPLIFYING WINDOWS 95 COMMON CONTROLS

Microsoft Foundation Classes 3.2

By Richard V. Dragan

Microsoft Foundation Classes (MFC) 3.2, the latest version of Microsoft's popular collection of application frameworks, offers solid improvements over the older MFC 3.1 included with Microsoft Visual C++ 2.1. The new enhancements fall into two main categories: support for the Windows 95 common controls and support for Windows Sockets (Winsock). Both sets of enhancements take advantage of multitasking and significantly ease the complications of programming in Windows 95. MFC 3.2 is slated to ship with the upcoming Visual C++ 2.2 and with several other C++ development systems from third-party MFC licensees.

THE COMMON CONTROLS

The common controls play an important part in the unique look and feel of Windows 95. The Windows Explorer, for instance, incorporates a number of these into its interface. In the Windows Explorer, the Tree View control allows you to view a hierarchical structure of folders and files, while the List View control displays the subfolders and files that reside within a given folder. Windows 95 then uses the Header control to display this information in separate Explorer windows, with the hierarchical tree structure on the left and focused file list on the right. To help the user manage the icons associated with each file, Microsoft also uses new ImageList APIs, which make it easier to load and display several icons at once.

These controls and APIs may seem to work effortlessly when used in an applet like the Windows Explorer, but accessing their functionality requires a great deal of acquired skill and background knowledge. Besides the new C APIs, you need to worry about private messages that manipulate these controls and command notifications that are sent from the controls to dialog boxes. The common controls offer more impressive features than older vanilla edit controls like list boxes or combo boxes, but they are also much more complicated.

The MFC 3.2 Windows Common Control Classes can dissipate much of this complication. This group of C++ classes simplifies the use of command controls via the Microsoft Visual C++ 2.2 Resource Editor and ClassWizard. The former lets you design dialog boxes with the command controls as if you were using standard Windows controls, while the latter automatically handles connecting messages

These controls and
APIs seem to work
effortlessly when used in
an applet like Windows
Explorer, but accessing
their functionality takes
skill and knowledge.

that are sent from the command controls. By significantly taming the new interface elements, MFC lets developers speed up the Windows 95 programming process.

The classes cover almost all of Windows 95. The CTreeCtrl and CListView classes manage the Tree View and List View controls. CTabCtrl simplifies use of the Tab Control (the familiar tabbed dialog box that handles the Properties of folders and files in Windows 95), while the CImageList handles the Windows 95 ImageList APIs. You can even remap Windows 95 hotkeys via the Hot Key control and the CHotKeyCtrl class, or use animation with the .AVI-based Animate controls and the CAnimateCtrl class. Nuts-and-bolts features of Windows 95, such as tool tips, toolbars, and status bars, are encapsulated in the CToolTipCtrl, CToolBarCtrl, and CStatusBarCtrl classes, respectively. These MFC classes are not limited to use under

Windows 95; you can access the new command controls under Windows NT 3.51 and Win32s as well.

WINDOWS SOCKETS AND MULTITHREADING

The Winsock programming model is a group of APIs based on the Berkeley Socket Distribution (BSD), a socket library for Unix. In addition to support for command controls, MFC 3.1 and MFC 3.2 also offer support for these sockets. Programmers can write and read data packets that move to and from the sockets, regardless of the underlying network protocols.

The CSocket class and CAsyncSocket class simplify the C API by replacing C calls with C++ methods. Several classes also provide support for writing to remote files through sockets, but ClassWizard does not allow you to derive new classes from the existing socket classes; in this arena, you're largely left to your own devices.

MFC 3.2 also fully supports the multitasking capabilities of Windows 95. Since Version 3.0, MFC code has been thread-safe, so that code can be executed by more than one thread at a time. (In contrast, ODBC classes rely on DLLs that may or may not be thread-safe.) Using the CWinThread class or the appropriate MFC macro, developers can easily create threads that are able to divide and conquer programming problems.

NEW REASONS FOR MFC

In the past, advanced Windows features like OLE 2.0 and ODBC were reason enough to use the Microsoft C++ model. With the encapsulation of the new Windows 32-bit common controls and Winsock into MFC 3.2, Microsoft's C++ is even more attractive than before. MFC 3.2, which hides the complicated details of new Windows 95 features but retains their functionality, will become more popular as 32-bit Windows becomes more prevalent. **Microsoft Foundation Classes 3.2.** Available only as a component of Microsoft and third-party C++ compilers. Microsoft Corp., Redmond, WA; 800-426-9400.

Circle 487 on reader service card

SOFTWARE

Multiuser Accounting

MULTIFACETED REPORTING

Solomon IV's built-in financial report writer should meet most users' financial reporting needs; it includes several standard financial-report formats that can be modified to meet specific requirements. But the report writer reads only posted GL transactions and therefore can't provide provisional financial statements for unposted batches. Solomon recommends the third-party product FRx if you need that capability.

All of Solomon IV's standard reports and forms (like checks and invoices) are written with R&R's SQL Report Writer. A runtime version of R&R is included with the System Manager module, and Solomon sells the full-license version for those who want to modify existing reports or forms or create others. Numerous sort and selection options are provided for most reports, but these can't be saved for future use; it would be useful if they could.

MANAGING CUSTOMIZATION

Solomon IV distinguishes itself by its ability to customize the application environment at two different levels without

changing a screen's underlying application code. Users see changes immediately because modifications made at either level of customization instantly update all screens and forms. The Customization Manager module tailors forms and screen layouts to the needs of individual users or the entire organization. You can add fields to screens (or hide them), establish minimum or maximum field values, add subform buttons, change field captions, and add or change field masks. And you can do all this without any programming expertise.

Event triggers are the keys to the awesome second level of customization. You can create miniature Visual Basic-style programs and associate them with a field or screen, so that when the user encounters the field or screen, the programs are executed. For example, a company might want to create a custom commission entry screen to be displayed whenever the user enters an invoice for a certain customer type. Experienced VB programmers can imbed code in fields to customize many functions, such as defining a field as required for data entry, password-protecting a field, and creating sophisticated routines that update other databases or run other applications. This ability gives you abundant customization capability while maintaining compatibility with future Solomon upgrades.

ROLLING YOUR OWN

If you need to develop an add-on application to meet a unique business need, you'll want to take a look at Solomon's Visual Basic Rapid Development Toolkit—the same tool kit used to create Solomon IV. With it and some Visual Basic expertise, you should be able to create just about any application you might need. Already, many third-party developers are releasing applications that interact with their software, including a Lotus Notes interface.

Solomon IV uses BTI's Scalable SQL database and does a good job of exploiting its power. Using standard SQL statements to access data, Solomon IV can push more of the database processing onto the server, thereby reducing network traffic. So to get

the best performance from Solomon IV, you'll want to invest in a fast file server with lots of memory.

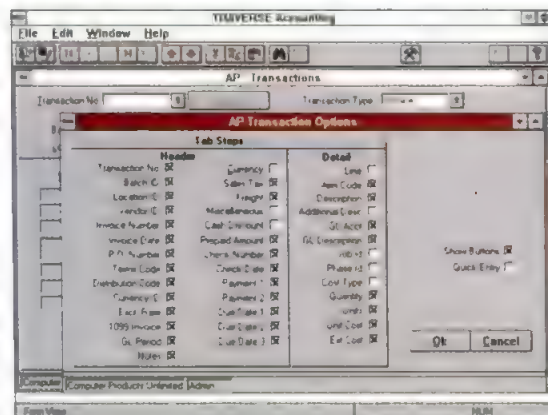
With Solomon IV, you get a potent mix of accounting features and powerful customization tools. Add to that the R&R Report Writer and the benefits of Scalable SQL and you have a package that has the depth to satisfy the particular accounting needs of your company, in a Windows environment.

Open Systems Inc.

Traverse Accounting Business Software for Windows

BY EDWARD M. KNEITEL AND W. WESLEY HOWARD III

With only three modules thus far shipped and a design not very far removed from its original character-based product, Open Systems' new Microsoft Access-based product, Traverse Accounting Business Software for Windows, Version 2.1, lacks some of the heavier-weight functionality of other Windows accounting packages. But the product has a few tricks that may keep it competitive.



You can speed up data entry in Traverse by eliminating the tab stops for all unused fields.

For example, its multicurrency support is quite good, because of Open Systems' vision to target multinational companies.

Microsoft Access fans will be the first to spot promise in Traverse. Its modules are 100 percent Access, and the product comes with an Access runtime module. If you have a full Access license, you can use Access's form builder, toolbox, and controls to customize the system (which comes with complete source code) and de-

FACT FILE

Solomon IV for Windows

List price (6 users): Accounts Payable module, \$1,295, Accounts Receivable module, \$1,295, Financial Report writer, \$1,295, General Ledger module, \$1,295, System Manager module, \$1,295. **Requires:** Server: Banyan Vines, LAN Manager, LANtastic, NetBIOS, NetWare, Microsoft Windows for Workgroups Workstation: 486/66 processor, 16MB RAM, Windows 3.x. **In short:** Solomon IV for Windows continues Solomon Software's tradition of offering strong financial-accounting features. But the powerful customization tools are what make this product stand out. The use of R&R Report Writer for all standard reports and its SQL orientation provide additional benefits, yet some may bemoan the minor user-interface glitches.

Solomon Software, 1218 Commerce Parkway, Findlay, OH 45839, 800-879-2767, 419-424-0422, fax, 419-424-3400

658 on reader service card

SUITABILITY TO TASK

	Power	Ease
Financial accounting	Good	Good
Customization	Excellent	Good
Reporting	Excellent	Good
Auditing and securing data	Excellent	Good

Multiuser Accounting

velop your own custom add-on modules.

Of course, you can also customize Traverse without using these Access tools. All screens and prompts are fully multilingual (English and Spanish are supported so far), and users can tailor keyboard controls to their needs.

The Access platform offers two further significant advantages: First, Open Systems will soon have a client/server version of the product; second, Access provides the tools for an accelerated development cycle for new modules.

TRAVERSING INSTALLATION

Seasoned users of LAN-based accounting systems won't have any problems with Traverse, but the documentation provides little guidance for the novice.

Security is also shockingly thin. For any user with a full copy of Access, maintaining airtight security in a Traverse system will be difficult. Even for runtime Access users, security is limited to menu options, so you have to define security options for each user, which is time-consuming. Additional security can be set up via Access, but this isn't documented and requires some expertise.

DEFINING THE CODE

Traverse sports a 24-character alphanumeric account code with a maximum of seven user-defined segments. Once segments are defined, users can link them to form valid GL accounts, either individually or through a handy copy function. These segments can be used for sorting during on-line lookup; and when further linked to system-defined account classes and types, they form the basis for financial reporting.

Traverse permits multicompany consolidation only if all companies share a similar account structure. Users can build foreign-currency translation tables with effect dates to support conversions within all modules on a transaction-by-transaction basis. The system doesn't calculate translation gains or losses, however.

Traverse streamlines transaction entry with customizable tab stops and display

styles—nice features found in all modules. Users may set up allocation accounts for automatic distributions to multiple accounts, which is helpful for postings from other modules. In addition, the system administrator can't prevent users from posting to prior or future periods.

Users can modify Traverse's chart-of-accounts inquiry screen to show a combination of current, prior, and future years' actual and budget data. The transaction inquiry can display current and history (purged) information, while the account-balance inquiry can toggle between current-, prior-, and future-year summary data. But Traverse lacks drill-down capability to view individual transactions that roll up into an account balance.

PAYING UP

The AP module offers a traditional features set. Multicurrency is supported throughout the three-module library, demonstrating Open Systems' strategy to target companies doing business offshore.

The voucherless invoice-entry func-

tion can be batch-controlled and can take advantage of the user-defined tab stops. Recurring entries can also be posted; but the date last posted isn't stored, leaving room for duplicate postings in the same month. Amazingly enough, Traverse does not check for duplicate invoices in the open-item file during data entry.

Check processing is straightforward, allowing for invoice-payment selection based on discount and due date. Voided checks are properly reversed in both AP and GL. Traverse doesn't have a flexible check-layout routine, however, and can't process manual checks.

THE STRENGTHS

Traverse's biggest strength is its AR module. Traverse effectively delivers streamlined data entry and reporting features and has paid special attention to both tax and commission reporting.

Billing features include customer credit checking with on-screen warnings, multiple ship-to addresses, and the capability to pull from a user-defined database of commonly sold items. Once posted, invoices can be put on hold, which hides them from printing on a customer statement. But Traverse doesn't provide any flexibility in formatting either invoices or statements directly.

The cash-receipts function is equally user-friendly. It allows for partial and split application of cash and discounts and can automatically apply a receipt to a customer's oldest invoices.

Reporting shines in Traverse, mostly because of the many options. And its proprietary Financial Report writer matches up well with character-based accounting products. If Financial Report writers aren't your thing, you can use a full copy of Access with its report builder, or you can print reports directly to an Microsoft Excel file, ready for formatting and tinkering via Word or Excel. But Traverse's relatively strong reporting features are marred by the absence of a true AP cutoff report to prove to the GL at month-end.

Traverse's present functionality is relatively basic, but it does offer some unique strengths. Because it's built entirely on Microsoft Access, the package can be user-enhanced pretty handily with modifications or custom-developed modules. □



Traverse's present functionality is basic, but it does offer some unique strengths.

FACT FILE

Traverse Accounting Business Software for Windows

List price (2 to 8 users): Accounts Payable module, \$1,200; Accounts Receivable module, \$1,200; General Ledger module (and Financial Report writer), \$1,200; System Manager module, \$1,200. **Requires:** Server: NetBIOS, NetWare, Microsoft Windows NT, Windows for Workgroups. Workstation: 486/66 processor, 16MB RAM, 100MB hard disk space, Windows 3.1. **In short:** This new offering from Open Systems is built on the Microsoft Access platform and is highly customizable. But limited functionality and poor performance may target this product to smaller companies.

Open Systems Inc., 7626 Golden Triangle Dr., Eden Prairie, MN 55344; 800-328-2276, 612-829-1419; fax, 612-829-1493

469 on reader service card

SUITABILITY TO TASK

	Power	Ease of Use
Financial accounting	Fair	Good
Customization	Excellent	Good
Reporting	Fair	Good
Auditing and securing data	Fair	Good

PC Tech

THE DEFINITIVE GUIDE TO PC TECHNOLOGIES & TOOLS

C++ Windows 95 Update

C++ tools are in transition as they rush to add support for Windows 95.

By Matt Pietrek



So you're not going to put off that port to Windows 95 any longer? Before you begin to create Windows 95 versions of your Windows 3.x applications, you first have to decide whether to limp along with your existing 16-bit C or C++ code or make the big leap to a 32-bit code base.

Staying with 16-bit code is a far simpler solution, but your programs will suffer. They'll lack optimal protection under the operating system and won't be able to take advantage of many new features in Microsoft Windows 95 or Windows NT, such as flat addressing, multiple threads, memory-mapped files, and structured exception handling. Given the advantages, 32-bit programming is the obvious choice. What may be less clear is which 32-bit tools offer the best support for Windows 95's features like its

new enhanced common controls.

If you are already developing 32-bit applications under Windows NT, you'll find that Windows 95 programming is remarkably similar. Because of Microsoft's common Win32 API, your existing Windows NT C++ compiler will probably have no problem running under Windows 95. If you wish to include Windows 95-specific features or functions, however, you will have to upgrade your current compiler.

To help you cope with

IN THIS SECTION



TUTOR Jeff Prosis continues his investigation of the VFAT file system's storage efficiency when used to handle large partitions. The bad news is that things are worse than he originally thought. The good news is that there are several fixes to help you store more data on your hard disk. *page 345*



INSIDE WINDOWS 95 The Windows shell is a highly customizable environment. *page 355* Long filenames can be a dangerously mixed blessing in networked environments running a mix of 16-bit and 32-bit apps. *page 369* As the first mobile-aware OS, Windows 95 offers significant benefits for users on the go. *page 375*



POWER PROGRAMMING Jeff Prosis discusses techniques for putting bitmaps with transparent pixels into a device context. One involves the use of Windows 95's new image list, while the other technique lets you do it with your own DrawTransparent function derived from MFC's CBitmap class. *page 393*



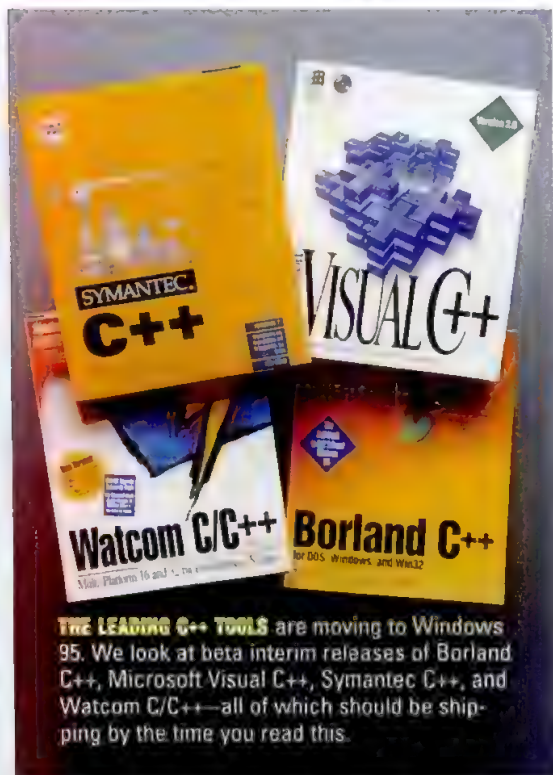
SPECIAL REPORT When Microsoft released Windows 3.1 back in 1992, we published a log of its 217 files—and got a tremendous response from technical readers. To help you become familiar with the myriad components of Windows 95, we offer an annotated listing of its 2,000-plus files. *page 423*



INSIDE OS/2 The OS/2 Workplace Shell is based on IBM's System Object Model (SOM), one of the hottest object technologies in the industry today. In the first of a two-part series, we look at SOM itself and its relation to the Workplace Shell. *page 513*



UTILITIES Douglas Boling's LaunchControl lets you launch Windows 3.1 and DOS apps the way you want them: sized, positioned, maximized, or minimized, and with a specified working directory. *page 523*



THE LEADING C++ TOOLS are moving to Windows 95. We look at beta interim releases of Borland C++, Microsoft Visual C++, Symantec C++, and Watcom C/C++—all of which should be shipping by the time you read this.

the transition to a new 32-bit platform, we offer a snapshot of the Windows 95 support available from the major C++ development systems: Borland C++ 4.52, Microsoft Visual C++ 2.2, Symantec C++ 7.2, and Watcom C/C++ 10.5. The survey does not include MetaWare High C/C++, because MetaWare does not intend to specialize in Windows 95 support. The MetaWare High C/C++ Windows NT product does support Win32 development and offers a highly optimized compiler. (For the most recent comparative

reviews of all the products discussed in this story, see "C++ Programming: Significant Development" in our issue of April 11, 1995.)

We also look at two familiar foundations of 32-bit Windows development: The Microsoft Foundation Classes 3.2, the latest release of the most popular Windows application framework, and the Microsoft Win32 Software Development Kit (SDK). While the SDK may be of limited value if you are not targeting Windows NT, it does provide

some low-level goodies, including debug versions of Windows 95 system DLLs.

TOOLS IN TRANSITION

Like the operating system they target, the C++ tools in this survey are in states of transition. As we went to press, Borland's C++ 4.5 had not been updated to include pre-release versions of the Windows 95 libraries and header files. These will be offered in an interim release, Borland C++ 4.52, which should be available by the time you read

IS IT WORTH THE PURCHASE PRICE FOR WINDOWS 95 DEVELOPERS?

The Win32 SDK

By Matt Pietrek

Prior to the release of Windows 3.0, developers had to purchase both a C compiler and the Windows SDK in order to program under Windows. After Windows 3.0 became popular, vendors began to include SDK-equivalent functionality with their compilers (Microsoft C++ 7.0 included the actual SDK). This trend has continued with the latest generation of 32-bit C compilers; each major vendor now ships its compiler with pieces of the Win32 SDK or a functional equivalent. The standalone SDK does provide a few features that are not included with third-party compilers, but the extra purchase is probably not justified if you are developing for Windows 95 alone.

WINDOWS NT FOCUS

Initially, the Win32 SDK provided header files, import libraries, documentation, and sample applications for Windows NT. Toward the end of the Windows 95 test cycle, however, Microsoft decided to insert its Windows 95 programming files into this existing SDK instead of creating a new product.

In theory, this combined SDK should contain all of the files necessary for development in Windows NT and Windows 95. In actuality, however, its contents focus more on Windows NT and leave some Windows 95 features in the lurch. Instead of providing all of the relevant files for both operating systems and letting developers decide which files are important, the combined SDK offers only a subset of these files.

The Win32 SDK also fails to support Windows 95 16-bit programming adequately. Windows 95 uses many new 16-bit API functions in system DLLs like USER.EXE and KRNL386.EXE. To access

these functions, developers need updated header files like WINDOWS.H and import libraries that contain the functions themselves. Unfortunately, these 16-bit files are not included in the SDK. If developers require access to these files, they will have to purchase the Microsoft Windows 95 Device Driver Development Kit separately. Granted, 16-bit programming files do not belong in a 32-bit SDK, but Microsoft should have created a separate product for the Windows 95 files—both 16- and 32-bit.

Since Microsoft includes most of the SDK functionality with Visual C++, the Win32 SDK is primarily for developers who are using third-party compilers. Such compilers do offer some SDK-equivalent functionality, but they do not contain Win32 SDK's Windows 95 debug build.

The build offers debug versions of system DLLs such as KERNEL32.DLL and USER32.DLL. When used in conjunction with a debugger, these DLL versions are extremely useful in tracking down programming bugs. If you pass an invalid window handle to an API function, for instance, the debug USER32.DLL emits a diagnostic to the debugger that identifies the problem.

WIN32 SDK VS. MICROSOFT VISUAL C++

It is difficult to tell where Visual C++ ends and the Win32 SDK begins. The Win32 SDK confines its include files, import libraries, and documentation to functionality provided by the operating system. Visual C++ provides almost all of this information, then adds additional files for the C/C++ runtime environment and API. The only area in which the SDK differs from Visual C++, therefore, is in its collection of utility programs. Even here, however, some overlap occurs. For instance,

the SDK contains a utility called DLGEDIT that creates and edits dialog resources. Visual C++ does not contain the same utility, but it can create and edit dialog resources within its IDE.

The Win32 SDK utilities that are not included in Microsoft Visual C++ are relatively obscure applications that most programmers will not use on a regular basis. Many of the useful tools such as the Working Set Tuner (WSTUNE.EXE) are oriented toward Windows NT and do not work well under Windows 95. There is one subdirectory of programs, however, that is specific to Windows 95 development. With the exception of a few applications (including HeapWatch32), these Windows 95-specific tools are either recycled from the Windows 3.1 SDK or limited in usefulness.

If you are programming under only Windows NT, or under Windows 95 and Windows NT, the SDK is a worthwhile investment. There are debug symbols for the Windows NT system DLLs, system level debuggers, documentation, and many useful programming utilities. If you are developing under Windows 95 alone, however, the only incentives to purchase the Win32 SDK are the Windows 95 debug build and Microsoft's system-level debugger (WDEB386). Unfortunately, all of the import libraries and sample programs assume that you are using the Microsoft compiler. Unless you desire an overly exhaustive source of Win32 programming information, wait for your compiler's Windows 95 update.

Microsoft Win32 Software Development Kit. Available only through the Microsoft Developer Network Development Platform: \$495. Microsoft Corp., Redmond, WA; 800-426-9400.

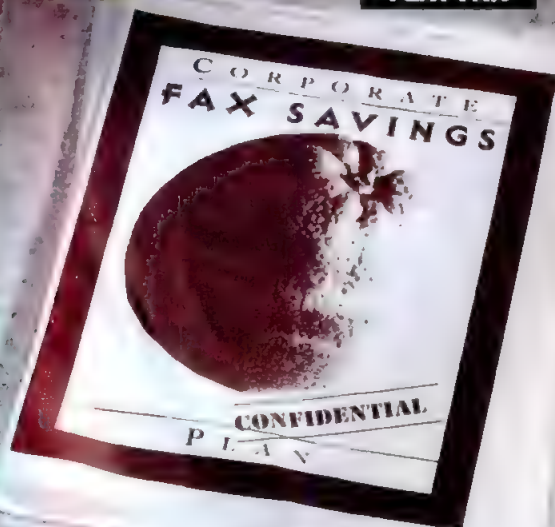
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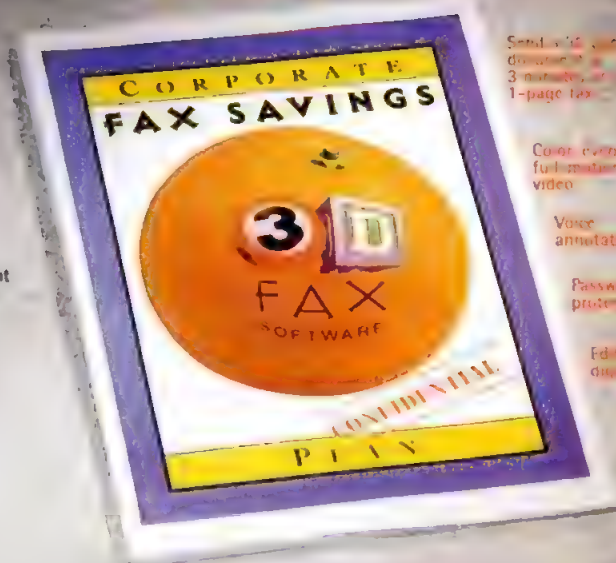
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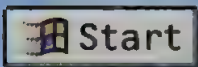
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By Jeff Prosis

Can VFAT Handle Large Disks?

If you've got a big hard disk, Windows 95 may have a surprise for you.



Is Windows 95's VFAT file system up to the job of handling today's large hard disks? That was the question posed in the Tutor column of June 27, 1995, which explored the relationship between a disk volume's cluster size and its storage efficiency.

The answer was more than a little disturbing. Because of Microsoft's desire to maintain compatibility with Windows 3.1, VFAT inherits a serious limitation of its predecessor, the FAT file system. As a result, you could be losing scores of megabytes of disk space to built-in file system inefficiencies. Figure 1 graphically gives you an idea of this inefficiency.

The June 27 column prompted such a flood of e-mail that I decided to visit this topic again. There is both good news and bad news to report. The good news is that there is something you can do to recover that lost space without repartitioning your drive into smaller volumes. The bad news is that there was a bug in my CHKDRIVE utility that made storage efficiency look better than it really is. It turns out that VFAT's handling of large hard disk volumes is even more dismal than I first believed. You'll see what I mean in a moment.

CLUSTER SIZE VS. STORAGE EFFICIENCY (REDUX)

Let's begin by briefly reviewing the relationship between cluster size and storage efficiency. When a file is written to a VFAT volume, one or more clusters of disk space are allocated to hold the file's data. A *cluster* is a group of one or more contiguous sectors and is the smallest unit a file system can allocate (hence its other, more formal name, *allocation unit*). For hard disk volumes larger than 16MB, there are normally 4, 8, 16, 32, or 64 sectors per cluster. (A *sector* is the smallest unit of disk space that the hardware can read or write, and it is equal to 512 bytes.)

To record the file's location, the file system writes one or more entries to an on-disk data

structure called the *file allocation table*, or FAT, from which VFAT (Virtual File Allocation Table) takes its name. The FAT contains one entry for each cluster on the drive. Each of a file's FAT entries contains the address of the next cluster in the allocation chain—once the file's starting cluster number is known, the file system can read back the entire file, no matter where the clusters are located on the disk. The starting cluster number is stored separately in a 32-byte directory, along with the filename and other information.

Because disk space is allocated in clusters,

"total allocation units on disk" and multiplying the result by "bytes in each allocation unit."

2. Type DIR C:\S\A to determine the cumulative length of all the files on the disk except for those with special attributes.

3. Subtract this number from the number computed in step 1. The result is a close approximation of the cumulative cluster overhang.

On a drive formatted with a 2K cluster size, the overhang will generally be less than 5 percent of the allocated disk space. Thus, the VFAT file system is capable of managing small disk volumes relatively efficiently.

The problem is that VFAT volumes, like FAT volumes, are limited in the number of clusters they may contain. This means that to deal with a higher-capacity disk volume, the file system must use a larger cluster size. (The cluster size is set by the FORMAT command. You have no control over it other than by controlling the

partition size.) Drives with formatted capacities up to 128MB use 2K clusters, drives that fall between 128MB and 256MB use 4K clusters, and so on. Each time the drive capacity doubles, the cluster size must double too. The VFAT file system's limit is about 65,500 FAT entries. This limitation can't be removed without sacrificing compatibility with the FAT file system used in DOS and Windows 3.x, so rather than increasing the size of the FAT as the volume size grows, VFAT has no choice but to increase the cluster size. And as the cluster size grows, the amount of space lost to cluster overhang grows as well.

Drives with a capacity of 1.2GB are common these days, but because the cluster size on such drives—32K—is usually large

compared with the average file size, storage efficiency plummets. To understand why, consider two drives: one a 120MB drive formatted with 2K clusters, and the other a 1.2GB drive with 32K clusters. If the average file size is 3K, then the 120MB drive will lose, on average, 1K per file to cluster overhang—the average file will be allocated two clusters, or 4K, of disk space, and 4K minus 3K is 1K. The 1.2GB drive, on the other hand, will average a whopping 29K of overhang per file. If each drive contains 5,000 identical files that together total 15,000K in length, those 5,000 files will require 20,000K of disk space on the 120MB drive, but 160,000K, or eight times as much disk space, on the 1.2GB

Cluster Size Vs. Storage Efficiency

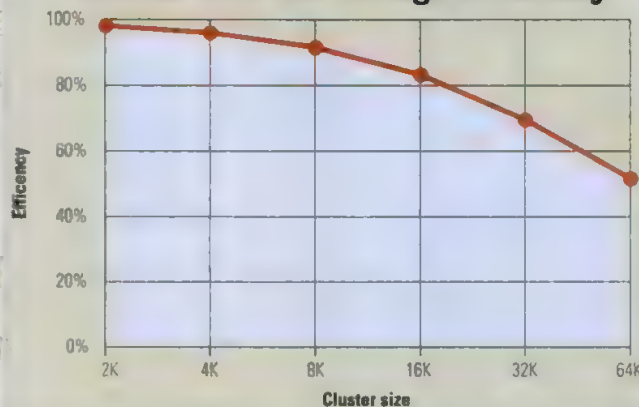


FIGURE 1: Given a typical mix of small and large files, the storage efficiency of a VFAT volume drops substantially as the cluster size is increased to handle large volumes.

no file (or part of a file) can occupy less than one full cluster. On a disk formatted with clusters 4 sectors long, where each cluster is 2,048 bytes, even a 1-byte file will consume 2,048 bytes. The remaining 2,047 bytes are unusable and constitute overhang. This isn't a problem as long as the cluster size stays reasonably small. You can estimate the amount of disk space lost to overhang on drive C: using the following procedure:

1. Type CHKDSK C: to generate a report of disk space usage on drive C:. Compute the number of bytes of space allocated on the drive by subtracting the "available allocation units on disk" value reported by CHKDSK from

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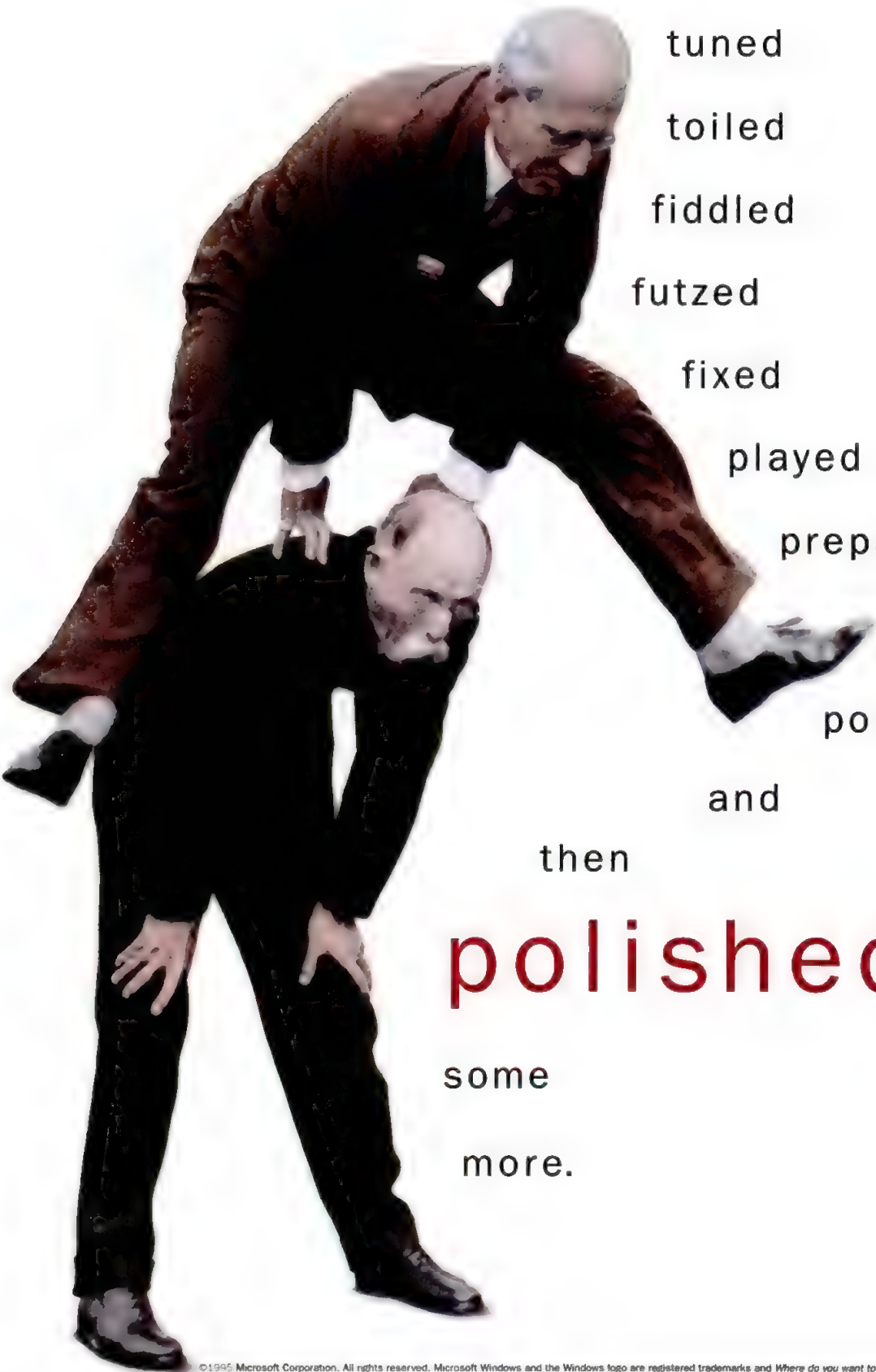
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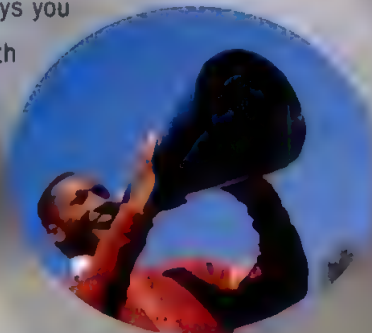


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petitive with its Class Editor, distributed build capability, and ability to support with 16-bit and 32-bit targets.

We also looked at a beta version of Watcom C/C++ 10.5, a substantial upgrade to release 10.1 despite the modest name change. Version 10.5 will provide a Windows 95–hosted IDE but will not initially include the latest MFC 3.2 release. Watcom is unique in that its compiler can be natively hosted under both 16-bit and 32-bit Windows and OS/2, and its long list of supported targets includes DOS,

extended DOS, 16-bit Windows, Windows NT, Windows 95, OS/2, and even NetWare Loadable Modules (NLMS).

CLASS LIBRARIES

In recent years, commercial application development has been centered around class libraries like MFC and Borland's OWL. Since both MFC and OWL have 16- and 32-bit versions, the transition from code written for Windows 3.x to 32-bit code for Windows 95 is relatively easy. In many cases, well-written

16-bit C++ programs that use class libraries can simply be recompiled as 32-bit applications.

Up to now MFC and OWL have offered minimal support for new features in the Windows 95 user interface, however. For instance, MFC 3.0 (which shipped with Microsoft Visual C++ Version 2.0 and Version 2.1) supports the new Windows 95 tabbed dialogs, but it implements them with additional MFC code rather than with built-in operating system code. The new MFC 3.2 now

MOVING TO A 32-BIT-ONLY WORLD

Microsoft Visual C++ 2.2

By Richard V. Dragan

In late beta testing at the time of this writing and expected to ship by the time this story appears, Microsoft Visual C++ 2.2 shows just how good C++ compilers and tools can look under Windows 95. The new Visual C++ will offer full support for Windows 95 features such as long filenames, ToolTips, and other user-interface enhancements. It will also include MFC 3.2 and the new release of Visual C++ 1.52b, an update to Microsoft's 16-bit compiler.

The Visual C++ IDE uses an MDI (Multiple-Document Interface) approach to managing source code, editing resources, debugging, and building projects within a single program. Though there were rumors of the demise of MDI in Windows 95, Visual C++ looks very good under the new OS; its look and behavior make it a true Windows 95 application.

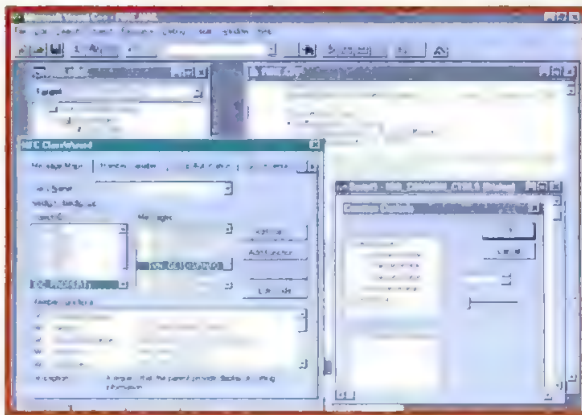
CONTINUING THE WIZARD TREND

Visual C++ pioneered a wizard-based approach to managing MFC C++ code. In Visual C++ 2.2, Microsoft continues the trend with wizards that support many of the best Windows 95 features automatically. For example, the AppWizard will generate a default application that makes use of long filenames and offers built-in support for toolbars, status bars, and ToolTips. Significantly, the Visual C++ resource editor lets you design dialog boxes using the new Windows 95 common controls—including Tree View, List View, Progress, and Animate controls—just as easily as with the standard Windows controls. And once you have designed dialog boxes that make

use of the latest Windows 95 user-interface styles, you'll find that Visual C++ 2.2's ClassWizard simplifies writing the code that brings your design to life. Just like normal Windows controls, ClassWizard allows you to map new common control messages—and there are many

Visual C++ also has an integrated debugger that offers fully graphical disassembly and command of watchpoints and breakpoints. Because of the integrated Just-In Time debugging feature, the Visual C++ debugger can be invoked after a program fails.

Visual C++ 2.2 will be free for registered Subscription Edition users or will be available for separate purchase. The CD-ROM will include the updated 16-bit Visual C++ 1.52b, which is a maintenance release, and the Windows NT 3.51 Step-Up Upgrade. This upgrade is important not only because of its performance-related enhancements, but also because it has added support for the Windows 95 common controls. This means that programs that use Windows 95 user-interface elements will also be able to run under Microsoft's high-end operating system. Also bundled with Visual C++ 2.2 are new versions of the OLE Control



NEW WIZARDS: Microsoft Visual C++ 2.2 supports the new Windows 95 controls. Its ClassWizard helps you map messages to and from Windows 95 common controls.

new ones to worry about in Windows 95—to custom class methods. There is even help text that appears as you browse these new events, a feature that will help programmers get familiar with what's involved in supporting the new Windows 95 interface.

The Visual C++ resource editor lets you design bitmaps, icons, cursors, and other resources. The resource editor works closely with ClassWizard, making it easy to add resources to MFC projects, particularly with new dialog classes that make use of the new Windows 95 controls. Because the resource editor is closely integrated, it's easy to move back and forth between resource design and the code used to manage your resources.

Developers Kit 1.1, which allows you to develop both 16- and 32-bit OLE-centered controls. There are also some useful new source-code samples, as well as white papers and presentations on MFC. The on-line help is also strong and shows off the Windows 95 help system to good effect.

All in all, this is a must-have upgrade for Windows 95 and Window NT programmers who use Visual C++ and want state-of-the-art support for the latest features in Microsoft's newest operating systems.

Microsoft Visual C++ 2.2. Estimated street price: \$199. Microsoft Corp., Redmond, WA; 800-426-9400.

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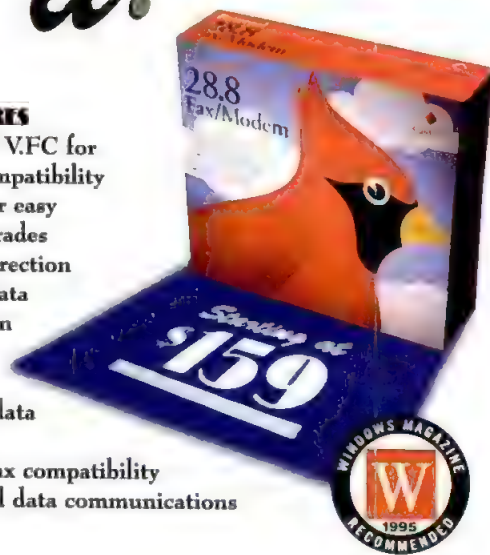
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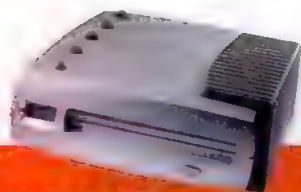
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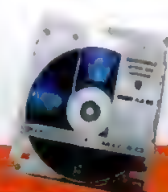
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supports all the advanced user interface features provided by the Windows 95 common controls. It also provides Windows Sockets classes for writing protocol-independent, communications-based applications.

PORT.EXE AND THINKING

If your 16-bit code avoids class libraries or is littered with 16-bit keywords like *near* or *far*, porting that code to 32 bits will be more difficult. In such a situation, PORT.EXE is a helpful tool. This Microsoft application,

which is included in the Win32 SDK and in Microsoft Visual C++ 2.1, scans your source code and alerts you to any potential porting problems.

Migrating a 16-bit program to Windows 95 can also be a problem when you use third-party DLLs to access databases or hardware devices. If the provider of these DLLs has not updated the code to a 32-bit environment, you will have to switch to a new 32-bit library or write thunks between your 32-bit code and the 16-bit DLL. Although 16- to 32-bit thunk-

ing is always messy and complex, it is smoother under Windows 95 than under Windows NT.

Writing thunks requires a 16-bit compiler, a 32-bit compiler, and an assembler like Microsoft's MASM or Borland's TASM. Under Windows 95, thunks also require a third compiler, which comes with the Win32 SDK.

VIRTUAL DEVICE DRIVERS

If your current application uses a DOS device driver to communicate with hardware com-

POLISHING STRONG WINDOWS 95 SUPPORT

Symantec C++ 7.2

By Richard V. Dragan

By the time you read this, Symantec will have shipped Symantec C++ 7.2, a Windows 95-ready interim release of its already-strong C++ offering. This release supersedes Version 7.0, which already includes support for important Windows 95 features such as long filenames and makes good use of Windows 95 user-interface conventions.

The new release will bring further improvements to the user interface, as well as to the final Windows 95 header, library, and sample files. It will also include MFC 3.2, which adds support for the Windows 95 common controls and socket classes.

With Version 7.0, Symantec lets you design a hierarchy of classes visually using its Class Editor. This lets you treat your C++ code as a group of classes, not a maze of source files. Through the use of background parsing of source files, Symantec C++ even lets you browse classes before you compile them, a revolutionary step forward in C++ programming.

Since Version 7.0, the Symantec integrated development and debugging environment (IDDE) itself looks like a Windows 95 application. The newer 7.2 release handles screen metric changes better and will intelligently stay out of the way of the Windows 95 taskbar. Unlike most of its rivals, Symantec C++ eschews the Multiple-Document Interface (MDI) for its IDDE in favor of a floating toolbox-based interface, where sets of windows can be moved all over the desktop. You may have noticed that titlebars are smaller under Windows 95. The Symantec C++ interface also lets you take advantage of this extra

screen real estate. Especially at higher screen resolutions, Symantec 7.0 really shows off the Windows 95 desktop to good effect.

The new release not only includes licensed versions of MFC from Microsoft, but also offers excellent compatibility

to target both 16-bit and 32-bit Windows MFC applications using the same toolset. This feature will grow less important as the world migrates over to 32-bit Windows during the next few years, but for now, it may be decisive for some Windows 3.x projects.

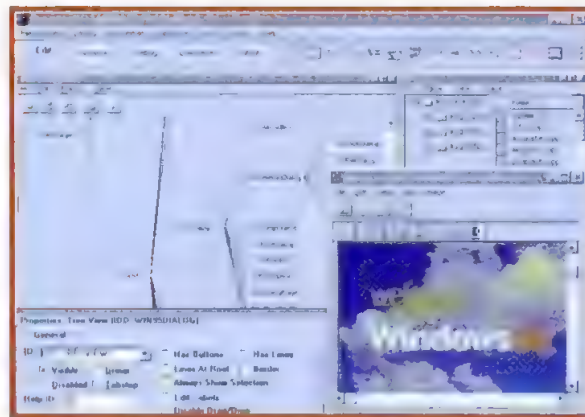
Naturally, there are new classes to manage in MFC 3.2. In the Symantec C++ 7.2 resource editor, the Resource Studio, you can add those fancy Windows 95 user-interface enhancements like Tree View, List View, Progress, and Spin Button controls to dialog boxes just as easily as you can add the standard Windows controls. Class-Express has also been enhanced to support the new custom control classes, and it helps you in navigating the dozens of new messages and events that go along with these new classes.

The compiler underpinnings to Symantec C++ include multi-threaded compilation under Windows 95, the powerful

Optlink linker, and the industrial-strength MultiScope debugger, which offers full graphical debugging under both 16-bit and 32-bit environments. Another tool, NetBuild, lets you distribute large builds across multiple networked systems for faster build times. (NetBuild can also take advantage of peer-to-peer networking in Windows 95.) With its new support for MFC 3.2 and enhancements to the user interface, this interim release adds an excellent set of Windows 95-certified tools to an already-powerful C++ product.

Symantec C++ 7.2. Estimated street price: \$199. Symantec Corp., Cupertino, CA; 408-253-9600.

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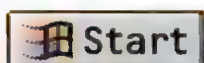


CLASS EDITOR: Symantec C++ 7.2 displays classes in a visual hierarchy, letting you browse and edit them without first having to run an editor-free compile.

with Microsoft Visual C++ code (you can even generate Code View-compatible debug files). Symantec C++ also offers its own version of Microsoft wizards, which let you automatically generate a default application and then customize MFC code with new classes and message handlers as you build your programs. Symantec calls its wizards by its own names. While Visual C++ has the AppWizard, Symantec's tool is the AppExpress. The ClassExpress tool is Symantec's counterpart to Visual C++'s ClassWizard. ProjectExpress is another tool to manage targets, which can include DOS and both 16- and 32-bit Windows.

One feature that sets Symantec C++ apart from its Microsoft rival is its ability

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C++ Windows 95 Update

ponents, it's probably a good idea to rewrite the driver as a VxD (virtual device driver). Windows 95 does support DOS drivers, but applications that use them are at a severe disadvantage. Not only are VxDs faster, but they can be dynamically loaded and do not reside in low memory.

In the past, writing VxDs was best left to the black arts of assembler code experts. The introduction of two new tools, however, makes it relatively easy to create virtual device drivers with a 32-bit C/C++ compiler

and debugging tools. The Windows 95 Device Driver Kit contains C-style wrappers for the common VxD functions, while Vireo Software's VtoolsD 1.1 provides support via a third-party toolkit.

OLE AND OXC CONTROLS

Microsoft has long been pushing OLE 2.0 as the object-oriented interface for both Windows NT and Windows 95. OLE Custom Controls (OCXs) are the containers by which OLE objects will be made available to application

programs. At their core, OCXs are simply DLLs with a predefined interface. At Microsoft, OLE was developed under the Windows NT umbrella, so Windows 95 doesn't really introduce anything substantially new for OLE development.

If you simply want to use prewritten OCXs, they are supported by Borland C++ 5.0 and Microsoft Visual C++ 4.0. If you want to create your own OCXs, both MFC and OWL contain built-in support for getting basic OCXs up and running.

IMPROVING ON EXEMPLARY CROSS-PLATFORM SUPPORT

Watcom C/C++ 10.5

By Richard V. Dragan

The chief strength of Watcom's C/C++ compiler has always been its ability to target myriad operating systems, including 16- and 32-bit Windows, OS/2, NetWare NLMs, and DOS. The beta release of Watcom C/C++ 10.5 provides even more impressive cross-platform support with the addition of a Windows 95 IDE. It also provides automatic MFC-code generation via Blue Sky Software Corp.'s Visual Programmer. It does not, however, include MFC 3.2, which supplies direct access to Windows 95 command controls and Windows Sockets (Winsock).

OS INDEPENDENCE

The Watcom compiler uses a set of core routines that are operating-system independent, which ensures consistent code generation on all platforms. Regardless of the platform that you are using, there is always access to all C++-language features, including templates, exception handling, and runtime type information (RTTI).

Under each operating system, the Watcom C/C++ 10.5 IDE takes on the same general appearance. Its new Windows 95 IDE does support long filenames, but it eschews all other Windows 95 user-interface enhancements in favor of the familiar Watcom interface. This host lacks the look and feel of ordinary Windows 95 applications, but it offers more target options than any other Windows 95-hosted compiler.

Version 10.5 can also integrate with several version-control packages, including Intersolv's PVCS. Within the IDE, compiler and linker switches let you

change target options and optimizations, and an MDI (Multiple-Document Interface) editor lets you edit source code and save it using long filenames. If this editor does not suit your needs, however, you can easily substitute a third-party editor and various other tools.

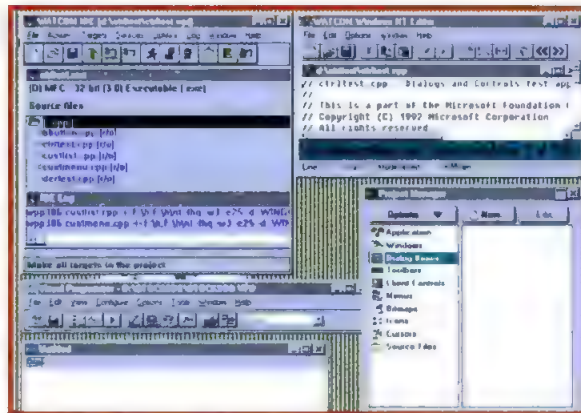
customize MFC source code without interfering with a program's visual prototype. (This is possible, because user-customized classes and automatically generated classes are identified by different file extensions.) Visual Programmer will not substitute for wizard-based management of C++ code, nor will it automatically build OLE 2.0 applications. But it can still be a useful development tool.

For developing 32-bit Windows 95 applications, Watcom C/C++ 10.5 will ship with the latest Windows 95 header and library files. Using these files, developers will be able to work with the Windows 95 common controls, Winsock, and other API enhancements. If you want this functionality with C++, however, you will have to wait for the updated version of MFC. Watcom's licensed version of MFC 3.0 does not include direct Windows 95 access, but Watcom will upgrade to MFC 3.2 sometime after the release of Windows 95 itself.

Watcom C/C++ 10.5 should be available by the time you read this review, and all registered users of Version 10.1 will receive a free copy. This interim release brings programmers to the world of Windows 95 quite smoothly and continues Watcom's tradition of offering powerful cross-platform tools and strong C++ language support. These tools now work with Microsoft's newest operating system, but more detailed support for Windows 95 will not be available until later in 1995.

Watcom C/C++ 10.5. List price: \$350; competitive upgrade, \$199. Watcom International Corp., Waterloo, Ontario, Canada; 800-265-4555.

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NEW WINDOWS 95 IDE: Watcom C/C++ 10.5 has added to its impressive cross-platform support, which includes OS/2, NetWare, Windows 3.1, and Windows NT targets.

Prior to Version 10.5, Watcom C/C++ did not provide wizards or experts for automated code generation and simplification of MFC programming. The new version bucks this trend by bundling Blue Sky's Visual Programmer, Version 2.02. This useful CASE tool lets you visually design Windows applications and then automatically generate the corresponding source code. Visual Programmer writes code from your functioning prototype via Switch-It Modules (SIMs) that support MFC 3.0 (for 32 bits) and MFC 2.5 (for 16 bits).

Consequently, Visual Programmer can use the same visual design to generate working MFC code for both 16 and 32 bits. Blue Sky's CASE automation even lets you

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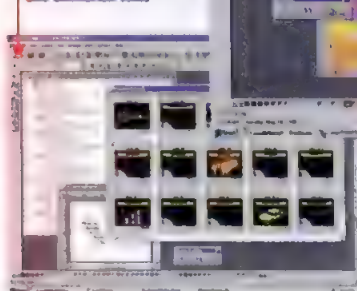
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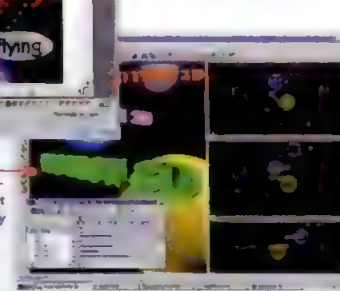
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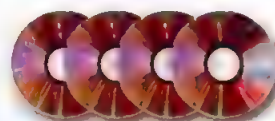


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PLOTTING A COURSE TO WIN32

Even if you need to support 16-bit Windows legacy code for the time being, it makes sense to begin plotting a course to the Win32 API. Microsoft's claim of a common Win32 API on both the Windows NT and Windows 95 plat-

forms is not literally true, but it appears more credible than ever with the Windows common controls now supported on Windows NT.

Today, we are clearly in a transition period as the major tools beef up support for Microsoft's newest operating system releases.

A number of important new releases are slated to appear by the end of the year, so you should enjoy strong support from your tool of choice in the near future. In this story's product summaries, we give you a snapshot of each vendor's path to Windows 95. □

SIMPLIFYING WINDOWS 95 COMMON CONTROLS

Microsoft Foundation Classes 3.2

By Richard V. Dragan

Microsoft Foundation Classes (MFC) 3.2, the latest version of Microsoft's popular collection of application frameworks, offers solid improvements over the older MFC 3.1 included with Microsoft Visual C++ 2.1. The new enhancements fall into two main categories: support for the Windows 95 common controls and support for Windows Sockets (Winsock). Both sets of enhancements take advantage of multitasking and significantly ease the complications of programming in Windows 95. MFC 3.2 is slated to ship with the upcoming Visual C++ 2.2 and with several other C++ development systems from third-party MFC licensees.

THE COMMON CONTROLS

The common controls play an important part in the unique look and feel of Windows 95. The Windows Explorer, for instance, incorporates a number of these into its interface. In the Windows Explorer, the Tree View control allows you to view a hierarchical structure of folders and files, while the List View control displays the subfolders and files that reside within a given folder. Windows 95 then uses the Header control to display this information in separate Explorer windows, with the hierarchical tree structure on the left and focused file list on the right. To help the user manage the icons associated with each file, Microsoft also uses new ImageList APIs, which make it easier to load and display several icons at once.

These controls and APIs may seem to work effortlessly when used in an applet like the Windows Explorer, but accessing their functionality requires a great deal of acquired skill and background knowledge. Besides the new C APIs, you need to worry about private messages that manipulate these controls and command notifications that are sent from the controls to dialog boxes. The common controls offer more impressive features than older vanilla edit controls like list boxes or combo boxes, but they are also much more complicated.

The MFC 3.2 Windows Common Control Classes can dissipate much of this complication. This group of C++ classes simplifies the use of command controls via the Microsoft Visual C++ 2.2 Resource Editor and ClassWizard. The former lets you design dialog boxes with the command controls as if you were using standard Windows controls, while the latter automatically handles connecting messages

These controls and
APIs seem to work
effortlessly when used in
an applet like Windows
Explorer, but accessing
their functionality takes
skill and knowledge.

that are sent from the command controls. By significantly taming the new interface elements, MFC lets developers speed up the Windows 95 programming process.

The classes cover almost all of Windows 95. The CTreeCtrl and CListView classes manage the Tree View and List View controls. CTabCtrl simplifies use of the Tab Control (the familiar tabbed dialog box that handles the Properties of folders and files in Windows 95), while the CImageList handles the Windows 95 ImageList APIs. You can even remap Windows 95 hotkeys via the Hot Key control and the CHotKeyCtrl class, or use animation with the .AVI-based Animate controls and the CAnimateCtrl class. Nuts-and-bolts features of Windows 95, such as tool tips, toolbars, and status bars, are encapsulated in the CToolTipCtrl, CToolBarCtrl, and CStatusBarCtrl classes, respectively. These MFC classes are not limited to use under

Windows 95; you can access the new command controls under Windows NT 3.51 and Win32s as well.

WINDOWS SOCKETS AND MULTITHREADING

The Winsock programming model is a group of APIs based on the Berkeley Socket Distribution (BSD), a socket library for Unix. In addition to support for command controls, MFC 3.1 and MFC 3.2 also offer support for these sockets. Programmers can write and read data packets that move to and from the sockets, regardless of the underlying network protocols.

The CSocket class and CAsyncSocket class simplify the C API by replacing C calls with C++ methods. Several classes also provide support for writing to remote files through sockets, but ClassWizard does not allow you to derive new classes from the existing socket classes; in this arena, you're largely left to your own devices.

MFC 3.2 also fully supports the multitasking capabilities of Windows 95. Since Version 3.0, MFC code has been thread-safe, so that code can be executed by more than one thread at a time. (In contrast, ODBC classes rely on DLLs that may or may not be thread-safe.) Using the CWinThread class or the appropriate MFC macro, developers can easily create threads that are able to divide and conquer programming problems.

NEW REASONS FOR MFC

In the past, advanced Windows features like OLE 2.0 and ODBC were reason enough to use the Microsoft C++ model. With the encapsulation of the new Windows 32-bit common controls and Winsock into MFC 3.2, Microsoft's C++ is even more attractive than before. MFC 3.2, which hides the complicated details of new Windows 95 features but retains their functionality, will become more popular as 32-bit Windows becomes more prevalent. **Microsoft Foundation Classes 3.2. Available only as a component of Microsoft and third-party C++ compilers. Microsoft Corp., Redmond, WA; 800-426-9400.**

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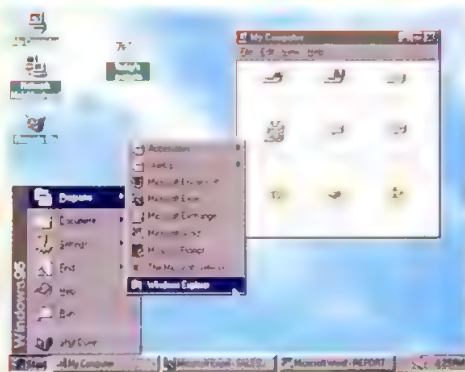


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Even the most powerful Pentium™ processor will slow to a crawl without sufficient system memory.

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Simple Technology offers a full line of memory upgrades for today's desktop and portable computers. We manufacture our own line of memory, so you can be assured each module will perform flawlessly for the life of your computer. Each module is backed by a Lifetime Warranty, and is guaranteed to be 100% compatible with Windows® 95.

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Upgrades**



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To determine how much RAM your system needs, add the minimum amounts of required RAM for each application you use. Typical users will need at least 8MB to run Windows® 95 with one or two applications, 16MB for true multitasking of business applications, and 32MB or more for desktop publishing and multimedia.

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US Robotics
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U.S. Robotics Sportster Vi 28.8 V.34 Faxmodem with voice mail

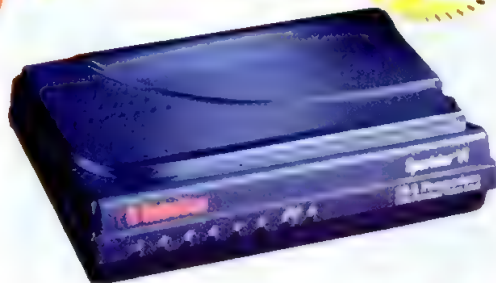
Your personal office message center

The Sportster Vi puts the convenience of a reliable U.S. Robotics modem, answering machine and fax machine in one compact unit—and it's easy to use, right from your home or office PC. Powerful voice processing capabilities and personal conferencing software lets you see what's happening to your document while talking about it. With the Sportster Vi, you can transmit data files during regular voice calls, set up a business-quality voice mail system with multiple mail boxes, and retrieve voice and fax messages from remote locations.

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- ▼ V.42 bis/MNP 5 data compression for throughput up to 115,200 bps
- ▼ Internal versions include built-in 16550 UART ▼ Digitally records voice messages, no tape to rewind or break ▼ Play and record messages through your phone or external speaker and microphone jacks ▼ Fax on Demand Menu lets callers choose documents to be faxed automatically ▼ Send group and delayed faxes ▼ While talking on a single phone line, you can simultaneously:
 - Run remote control software
 - Transfer files
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V.34!



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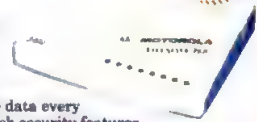
TA210 \$346.37 CDW 56591

Motorola Lifestyle 28.8 V.34 data and fax modems

- ◆ Quality unparalleled Motorola quality and reliability ◆ Easy Plug and Play (PnP) compatible ◆ Fast send and receive data at rates up to 115,200 bps using built-in V.42bis data compression ◆ Efficient error correction for clear faxes and reliable data every time ◆ Secure password and callback security features

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V.34!

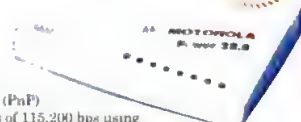


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External \$196.38 CDW 54591

Motorola Power Class 28.8 V.34 desktop modem

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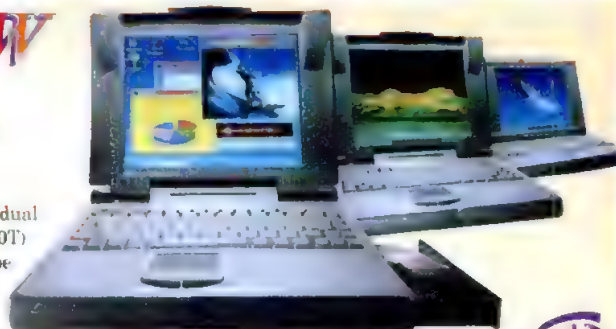
Extraordinary value and performance

EXTENSA 450, 450T

- ◆ IntelDX4, 75MHz CPU ◆ 4MB RAM std., 32MB max. ◆ 10.4" dual scan color display (450) ◆ 9.5" TFT active-matrix color display (450T) ◆ 340MB removable hard drive ◆ PC Card (PCMCIA) slot: 1) Type II ◆ Touchpad pointing device ◆ Ports: parallel, serial infrared, PS/2 ◆ NiMH battery ◆ Weight: 5 lbs.

EXTENSA 550, 550CD, 550CDT

- ◆ Intel 75MHz Pentium® processor ◆ PCI bus, 256KB L2 cache ◆ 8MB RAM std., 40MB max. ◆ 10.4" dual-scan display (550, 550CD) ◆ 10.4" TFT active-matrix color display (550CDT) ◆ 524MB removable hard drive ◆ Removable CD-ROM and floppy-disk drive (550CD, 550CDT) ◆ Integrated 16-bit sound (550CD, 550CDT) ◆ PC Card (PCMCIA) slot: 2) Type II or 1) Type III ◆ Touchpad pointing device ◆ Ports: parallel, serial infrared, PS/2, external monitor, audio in/out, microphone in ◆ NiMH battery ◆ Weight: 6.4 lbs.



450, 340MB
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550, 524MB
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550CD, 524MB
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550CDT, 524MB
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IBM® ThinkPad® 701C

The no-compromise subnotebook

- ✓ IntelDX4™ 75MHz CPU ✓ 8MB RAM, 24MB max. ✓ 10.4" dual-scan color display (701CS) ✓ 10.4" active-matrix color display (701C) ✓ Local bus video with 1MB RAM ✓ PCMCIA (accepts 2) Type II or 1) Type III ✓ 14.4K bps fax/modem with voice and telephony ✓ 85-key expandable keyboard ✓ Keyboard integrated pointing device ✓ Super NiCD battery ✓ Preloaded IBM-PC DOS™ V6.3, Windows® V3.11 and IBM OS/2 Warp V3.0 ✓ 3 year warranty ✓ Lightweight and compact: 4.5 lbs, 9.7" x 7.9" x 1.7"

701CS 360MB...\$3149.00 CDW 51794 701C 360MB...\$3699.00 CDW 51792

701CS 540MB...\$3449.00 CDW 51795 701C 540MB...\$3999.00 CDW 51793



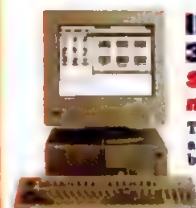
IBM® ThinkPad® 755 Series

The power user's portable

- ✓ IntelDX4™ 100MHz CPU (755CE, 755CSE, 755CD, 755CDV, 755CV) ✓ IntelDX4™ 75MHz CPU (755C) ✓ Intel Pentium® processor, 75MHz with 256KB L2 cache (755CX) ✓ 8MB RAM std., 40MB max. (755CE, 755CSE, 755CD, 755CX, 755CDV, 755CV) ✓ 4MB RAM std., 36MB max. (755C) ✓ Removable 340MB, 540MB or 810MB hard drives ✓ 10.4" TFT active-matrix color display (755CE, 755C, 755CD, 755CX, 755CDV, 755CV) ✓ 10.4" STN dual-scan color display (755CSE) ✓ 755CDV and 755CV displays feature removable back panels, and double as overhead projection display panels ✓ 32-bit accelerated local bus video, 1MB RAM ✓ 755CDV features motion video acceleration software, NTSC and PAL video out, and video in/out jacks (S-video and composite) ✓ PCMCIA slot: 1) Type III or 2) Type II or 1 ✓ 755CD and 755CDV only: integrated 2X CD-ROM drive: accepts 5.25" discs (swaps with included 3.5" floppy drive) ✓ Integrated TrackPoint™ pointing device ✓ Intelligent NiMH battery ✓ 755CX models (except SBJ) feature Lithium Ion battery ✓ Pre-installed PC-DOS, Microsoft Windows, Lotus Organizer and more ✓ 755CX, 755CDV, 755CV also feature pre-installed OS/2 Warp V3.0 with BonusPak ✓ Weight: 6.4lbs or less ✓ 3-year warranty



New 755CDV and 755CV!



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Superior technology means maximum value

The IBM PC 300 Series has everything you look for—a choice of Pentium® processors, ISA/VESA or PCI expansion bus, accelerated local bus video, and a rich suite of pre-loaded software. Plus, IBM HelpWare is standard as is a 3 year/1 year on-site warranty with next day response.



CPU	Hard Drive	RAMstd.	Expansion slots	Bays	CDW	Price
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P/90	540MB	16MB	1)PCI, 2)ISA	3	54250	\$2570.00
P/90	850MB	16MB	1)PCI, 2)ISA	3	54251	\$2885.00
P/75	540MB	8MB	2)PCI, 3)ISA	5	54252	\$1880.00
P/75	540MB	16MB	2)PCI, 3)ISA	5	54253	\$2225.00
P/75	850MB	16MB	2)PCI, 3)ISA	5	54254	\$2340.00
P/90	540MB	16MB	2)PCI, 3)ISA	5	54256	\$2628.00
P/90	850MB	16MB	2)PCI, 3)ISA	5	54257	\$2743.00



All models except 755C and 755CX (SBJ)

Integrated Mwave DSP communications:

- 14.4K data/fax modem • Full-duplex speakerphone and voice mail system

Integrated Mwave audio: • 16-bit, 44kHz stereo sound • Sound Blaster™ and General MIDI support

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**The world's premier 32-bit
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CD

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Office Automation CA

NEW

Panasonic KXP-6100 Laser Printer for Windows

Quick, affordable 6PPM laser printer

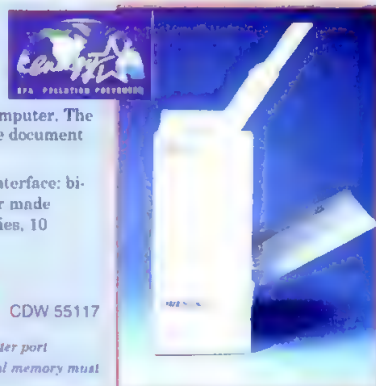
Specifically designed for Windows® users, the KX-P6100 receives its print commands directly from your computer. The KX-P6100 offers speedy output, laser-quality resolution, easy-to-use interactive help screens, and versatile document creation options. Ideal for 486 or Pentium™ computer users.

✓ 300 x 300 dpi— 600 dpi class output with Edge Enhancement Technology™ ✓ 6ppm print speed ✓ Interface: bi-directional parallel ✓ Semi-automatic duplexing ✓ On-screen interactive help ✓ Enhancements to printer made through user-installable software ✓ Paper handling: 100 sheets letter, 30 sheets of labels, 30 transparencies, 10 envelopes ✓ Features Panasonic's new Concorde engine ✓ Size: 5.2"x14.9"x11.3"

ONLY

\$399.00 CDW 55117

Hardware requirements: PC-compatible 486SX, 4MB RAM (8MB or more recommended), 4MB hard disk space, parallel printer port. Software requirements: MS-DOS V3.3 or later, MS Windows® V3.1 or later, permanent virtual memory (PC RAM plus virtual memory must equal 12.5MB or more).



KX-P6500

High-performance, affordable 600 dpi printer

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◆ On-screen interactive help ◆ 6ppm— 50% faster than other entry level 600 x 600 dpi printers ◆ Semi-automatic duplexing ◆ Paper handling: 100 sheets letter, 30 sheets of labels, 30 transparencies, 10 envelopes ◆ Features Panasonic's new Concorde engine ◆ Size: 5.2"x14.9"x11.3

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The next step in color inkjet printers

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- Fonts: 4 scalable, 5 LQ
- Paper capacity: 100 sheets
- Paper types: plain paper, labels, envelopes, transparencies, Epson 360, 720 and high quality glossy
- Paper sizes: letter, legal, A4, B5, statement, executive
- Maximum print area: 8.03" x 10.33" (letter)
- Parallel and serial interfaces
- 2 year warranty

720 dpi
black and white
or color!

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600 dpi quality at a personal price

- 600 dpi, 4 ppm print speed
- 2MB RAM std., with image compression technology
- Enhanced PCL 5 emulation, 45 scalable fonts
- Control panel software for Windows and DOS
- 100 sheet paper tray: letter, legal or envelope
- Energy Star compliant



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Stylus Color II

High resolution color inkjet printer

- Maximum resolution: 720 x 720 dpi black on plain paper, 720 x 720 dpi color on specially coated paper
- Maximum print speed: 3.5 ppm
- Fonts: 1 scalable, 3 LQ
- Paper capacity: 100 sheets
- Paper types: plain paper, labels, envelopes, transparencies, Epson 360, 720 and high quality glossy
- Paper sizes: letter, legal, A4, B5, statement, executive
- Maximum print area: 8.03" x 10.34" (letter)
- Parallel and serial interfaces
- 2 year warranty



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CALL! CDW 57348

ActionLaser 1100

Advanced laser printing at a personal price

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- PCL 5 emulation, optional PostScript
- Control panel software for Windows and DOS
- 100 sheet paper tray: letter, legal or envelope
- Energy Star compliant



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Personal Document Station



The Epson ES-300GS Personal Document Station is a complete office automation solution that makes it easy to move, store and capture documents electronically.

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Affordable, full-featured color scanner

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- Maximum document size: 8.5" x 11"
- Internal 30 bit processing for brilliant colors
- Includes SCSI interface, cable, TWAIN driver
- Includes Adobe Photoshop L/E, Xerox Textbridge OCR
- 2 year warranty



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ES-1200C Pro

Professional-quality color scanner

- Resolution: 600 dpi optical, 2400 dpi interpolated
- Maximum document size: 8.5" x 11.6"
- Selectable 24 bit color or 256 grayscale scanning
- Internal 30-bit processing for maximum color fidelity
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- Includes SCSI interface, cable, TWAIN driver



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By Jeff Prosise

Can VFAT Handle Large Disks?

If you've got a big hard disk, Windows 95 may have a surprise for you.



Is Windows 95's VFAT file system up to the job of handling today's large hard disks? That was the question posed in the Tutor column of June 27, 1995, which explored the relationship between a disk volume's cluster size and its storage efficiency. The answer was more than a little disturbing. Because of Microsoft's desire to maintain compatibility with Windows 3.1, VFAT inherits a serious limitation of its predecessor, the FAT file system. As a result, you could be losing scores of megabytes of disk space to built-in file system inefficiencies. Figure 1 graphically gives you an idea of this inefficiency.

The June 27 column prompted such a flood of e-mail that I decided to visit this topic again. There is both good news and bad news to report. The good news is that there is something you can do to recover that lost space without repartitioning your drive into smaller volumes. The bad news is that there was a bug in my CHKDRIVE utility that made storage efficiency look better than it really is. It turns out that VFAT's handling of large hard disk volumes is even more dismal than I first believed. You'll see what I mean in a moment.

CLUSTER SIZE VS. STORAGE EFFICIENCY (REDUX)

Let's begin by briefly reviewing the relationship between cluster size and storage efficiency. When a file is written to a VFAT volume, one or more clusters of disk space are allocated to hold the file's data. A *cluster* is a group of one or more contiguous sectors and is the smallest unit a file system can allocate (hence its other, more formal name, *allocation unit*). For hard disk volumes larger than 16MB, there are normally 4, 8, 16, 32, or 64 sectors per cluster. (A *sector* is the smallest unit of disk space that the hardware can read or write, and it is equal to 512 bytes.)

To record the file's location, the file system writes one or more entries to an on-disk data

structure called the *file allocation table*, or FAT, from which VFAT (Virtual File Allocation Table) takes its name. The FAT contains one entry for each cluster on the drive. Each of a file's FAT entries contains the address of the next cluster in the allocation chain—once the file's starting cluster number is known, the file system can read back the entire file, no matter where the clusters are located on the disk. The starting cluster number is stored separately in a 32-byte directory, along with the filename and other information.

Because disk space is allocated in clusters,

"total allocation units on disk" and multiplying the result by "bytes in each allocation unit."

2. Type DIR CA/S/A to determine the cumulative length of all the files on the disk except for those with special attributes.

3. Subtract this number from the number computed in step 1. The result is a close approximation of the cumulative cluster overhang.

On a drive formatted with a 2K cluster size, the overhang will generally be less than 5 percent of the allocated disk space. Thus, the VFAT file system is capable of managing small disk volumes relatively efficiently.

The problem is that VFAT volumes, like FAT volumes, are limited in the number of clusters they may contain. This means that to deal with a higher-capacity disk volume, the file system must use a larger cluster size. (The cluster size is set by the FORMAT command. You have no control over it other than by controlling the

partition size.) Drives with formatted capacities up to 128MB use 2K clusters, drives that fall between 128MB and 256MB use 4K clusters, and so on. Each time the drive capacity doubles, the cluster size must double too. The VFAT file system's limit is about 65,500 FAT entries. This limitation can't be removed without sacrificing compatibility with the FAT file system used in DOS and Windows 3.x, so rather than increasing the size of the FAT as the volume size grows, VFAT has no choice but to increase the cluster size. And as the cluster size grows, the amount of space lost to cluster overhang grows as well.

Drives with a capacity of 1.2GB are common these days, but because the cluster size on such drives—32K—is usually large

compared with the average file size, storage efficiency plummets. To understand why, consider two drives: one a 120MB drive formatted with 2K clusters, and the other a 1.2GB drive with 32K clusters. If the average file size is 3K, then the 120MB drive will lose, on average, 1K per file to cluster overhang—the average file will be allocated two clusters, or 4K, of disk space, and 4K minus 3K is 1K. The 1.2GB drive, on the other hand, will average a whopping 29K of overhang per file. If each drive contains 5,000 identical files that together total 15,000K in length, those 5,000 files will require 20,000K of disk space on the 120MB drive, but 160,000K, or eight times as much disk space, on the 1.2GB

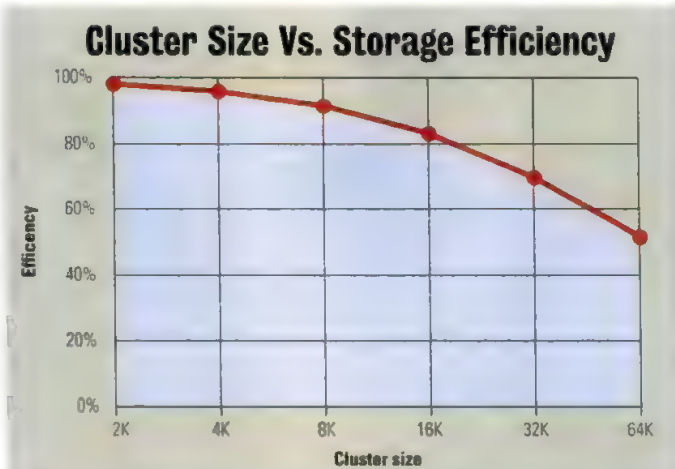


FIGURE 1: Given a typical mix of small and large files, the storage efficiency of a VFAT volume drops substantially as the cluster size is increased to handle large volumes.

no file (or part of a file) can occupy less than one full cluster. On a disk formatted with clusters 4 sectors long, where each cluster is 2,048 bytes, even a 1-byte file will consume 2,048 bytes. The remaining 2,047 bytes are unusable and constitute overhang. This isn't a problem as long as the cluster size stays reasonably small. You can estimate the amount of disk space lost to overhang on drive C: using the following procedure:

1. Type CHKDSK C: to generate a report of disk space usage on drive C:. Compute the number of bytes of space allocated on the drive by subtracting the "available allocation units on disk" value reported by CHKDSK from

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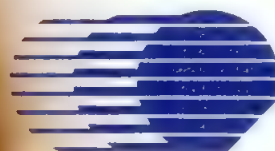
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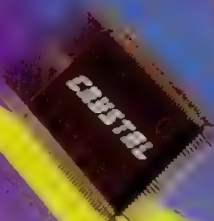


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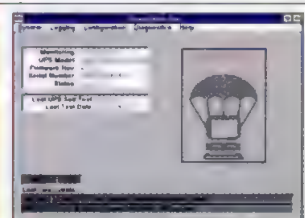
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drive. These numbers are admittedly contrived, but the point they make is still valid: The larger the cluster size and the smaller the average file size, the more disk space you stand to lose.

Advanced file systems such as OS/2's HPFS and Windows NT's NTFS avoid this problem by restricting the cluster size and increasing the limit on the number of clusters that a volume may contain. But small cluster sizes and large volume sizes are mutually exclusive on VFAT drives because of the limited number of FAT entries.

THE CHKDRIVE UTILITY

The numbers quoted in the previous paragraph are based on one key assumption: that the average file size is 3K. This may or may not be realistic for your hard disk. To help you gauge the storage efficiency of your hard disk using real numbers rather than assumed ones, the June 27 column introduced a utility named CHKDRIVE that examines each and every file and computes a storage efficiency value based on the total length of the files and the total disk space required to store them.

Unfortunately, CHKDRIVE contained a bug. If the cluster size is 4K and a file is 5K long, the overhang is 3K. The old version of

CHKDRIVE inaccurately computed the overhang to be 1K, not 3K. This skewed the results, especially for large disk volumes where the cluster size tends to be much larger than the average file size. I've since revised CHKDRIVE to eradicate the bug.

Figure 2 shows reports issued by the old and new versions of CHKDRIVE for the same hard disk. Note the huge discrepancy in storage efficiencies reported for drives with 32K clusters. The actual storage efficiency is closer to 50 percent than 80 percent, meaning that for every 1 byte of file data stored on the drive, 1 byte of space is lost to overhang. If this drive is filled up with files similar to the nearly 7,000 files that already reside on it, it will hold only about half of its advertised capacity. This isn't the fault of the drive manufacturer, but of the file system. Copy the same files to an HPFS or NTFS drive and the files will require far less physical disk space.

You can download the modified version of CHKDRIVE from PC MagNet and *PC Magazine's* Internet site. It comes complete with source code written in C. The new version differs from the original version in a few important respects. First, commas were added to make the output more readable. Second,

CHKDRIVE now reports the drive's cluster size, so you don't have to run CHKDSK to determine the cluster size independently. The line for that cluster size in the storage efficiency table is marked with an arrow (<--).

In addition, I removed the FAT space variable from the efficiency equation. The original CHKDRIVE calculated storage efficiency by dividing the total size of all files by the space consumed by those files (size plus overhang) plus the amount of FAT space required. It's debatable whether FAT space should be included in the calculation, so I omitted it the second time around. Efficiency is now calculated simply by dividing the cumulative file size by the total disk space consumed. This makes very little difference in the results, but it provides a more accurate picture of the usable disk space that is lost when the cluster size grows too large.

The new version of CHKDRIVE also includes files stored in hidden subdirectories in its calculations, whereas the original version did not. My thanks to Neil Rubenking, Greg Wolking, and the many readers who contacted me via PC MagNet for their suggestions and bug reports.

One inefficiency that CHKDRIVE does not take into account is that large cluster sizes affect subdirectories too. Each subdirectory uses a specially marked file to store the 32-byte directory entries for the files and subdirectories contained in it. These special files are subject to cluster overhang, too, so a large drive with a couple of hundred subdirectories typically loses a few more megabytes to overhang than CHKDRIVE indicates.

To run CHKDRIVE, simply type CHKDRIVE, followed by a drive letter, at the command prompt like this:

```
CHKDRIVE C:
```

If you omit the drive letter, the default is to analyze the current drive. You can capture the output to a file by using an output redirection operator like this:

```
CHKDRIVE C: >RESULTS.TXT
```

Or you can route the results to a printer by substituting the printer port's device name (for example, LPT1:) for RESULTS.TXT in the statement above. Note that CHKDRIVE was designed for use on normal, uncompressed drives; the results it reports when run on a compressed drive are not accurate. In fact, compressing a drive is the *best* way to overcome VFAT's efficiency limitations. The next section explains why.

THE COMPRESSION SOLUTION

One way to circumvent the cluster size problem is to partition a large drive into several smaller logical drives. If a drive is brand-new

Old and New CHKDRIVE Compared

OLD CHKDRIVE

Scanned 6862 files in 510 directories on drive C:
Cumulative length of all files is 396372203 bytes

Cluster Size	Overhang (Bytes)	FAT Space (Bytes)	Efficiency
2K	6224107	394728	98.4%
4K	11131115	201830	97.2%
8K	19359979	105768	95.3%
16K	32614635	58128	92.4%
32K	51849451	34752	88.4%
64K	77736171	23448	83.6%

NEW CHKDRIVE

Scanned 6,862 files in 510 directories on drive C:
Cumulative length of all files is 396,372,203 bytes
Cluster size is 8,192 bytes (8K)

Cluster Size	Overhang (Bytes)	Efficiency
2K	7,829,269	98.1%
4K	16,975,637	95.9%
8K	36,853,525	91.5% <--
16K	79,812,373	83.2%
32K	173,004,565	69.6%
64K	371,971,861	51.6%

FIGURE 2: A bug in the old version of CHKDRIVE made storage efficiencies look better than they really are. These output listings from the old and new versions of CHKDRIVE, both taken from the same hard disk, show how sharply efficiency drops off as the cluster size increases.

and contains no data, repartitioning is easy: Just fire up the FDISK utility and partition the drive as desired. But if the drive contains data, you must do a full backup first, because FDISK destroys everything that's there.

A better solution is to use on-the-fly disk-compression software. Virtually all disk-compression products reduce or eliminate cluster overhang by tracking file allocations at the byte or sector level. For example, MS-DOS 6.22's DriveSpace compression driver (which was called DoubleSpace in MS-DOS 6.0) lumps compressed files together in a hidden file called a *compressed volume file*, or CVF. Inside the CVF, allocations are made on a per-sector basis no matter what the size of the compressed volume.

Uncompressed, a 500MB drive uses 8K clusters, so up to 8,191 bytes of disk space may be left unused in every file. If the same drive is compressed with DriveSpace, the maximum per-file overhang is reduced to 511 bytes, or one byte less than the length of a sector. As a result, the simple act of compressing the drive boosts storage efficiency to the high 90-percent range. An often overlooked benefit of disk-compression software is that in addition to expanding a drive's storage capacity by compressing the data written to it, it also enables more efficient usage of a drive's available space.

Both MS-DOS 6.22 DriveSpace and Windows 95 DriveSpace limit the CVF to 512MB, meaning hard disks larger than about 256MB must be broken into two or more volumes when they are compressed. Fortunately, you can easily "partition" an uncompressed volume into two or more compressed volumes using DriveSpace's installation software. Thus, you might divide a 1.2GB drive into three equal 400MB drives that each deliver the equivalent of 700 to 800MB of storage space. If you're a Windows 95 user, you also have the option of using the DriveSpace3 package featured in Microsoft Plus. DriveSpace3 packs compressed data more tightly than DriveSpace (delivering superior compression ratios) and can handle compressed volumes up to 2GB in length.

Version 4.0 of Stac Electronics' highly acclaimed Stacker disk-compression software outperforms DriveSpace when it comes to reducing overhang. Rather than allocating space in chunks of 512 bytes, Stacker packs compressed files together on byte boundaries and eliminates overhang altogether. This is one of the features that enables Stacker to achieve higher overall compression ratios than DriveSpace. And like DriveSpace3, Stacker 4.0 can create compressed drives as large as 2GB. The downside to using Stacker with Windows 95 is that its real-mode design

drags down performance. Stac is expected to ship a product called Stacker Compatibility Pack for Windows 95 that restores most of the lost speed.

Lest you get the wrong impression, these disk-compression utilities are not completely without drawbacks. Some applications will not let you install them on a compressed drive, and if for some reason you're unable to boot from the hard disk, you could lose all the data in the CVF. These problems are, however, quite rare. I've been using the version of DriveSpace that comes in the Microsoft Plus! for Windows 95 package and haven't had a single problem.

In case you're wondering, there are *some* benefits to large cluster sizes. For example, large clusters lead to lower levels of file fragmentation and therefore have a positive impact on performance. But the drawbacks of large cluster sizes far outweigh the benefits. If you use DOS, Windows 3.x, or Windows 95 and your PC is equipped with a high-capacity hard disk, minimize disk overhang and inefficiency by dividing your disk into several partitions of just under 256MB or 512MB or by applying disk compression.

Maybe one day Windows will be fitted with a modern file system like those of OS/2 and Windows NT. Until then, do what you can to overcome its limitations. □

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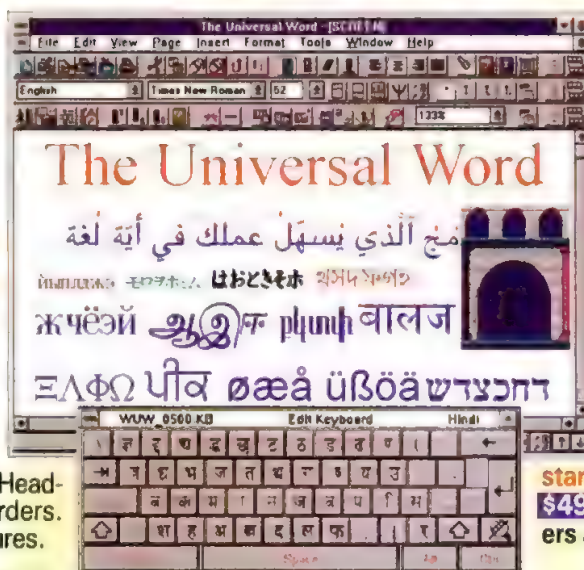
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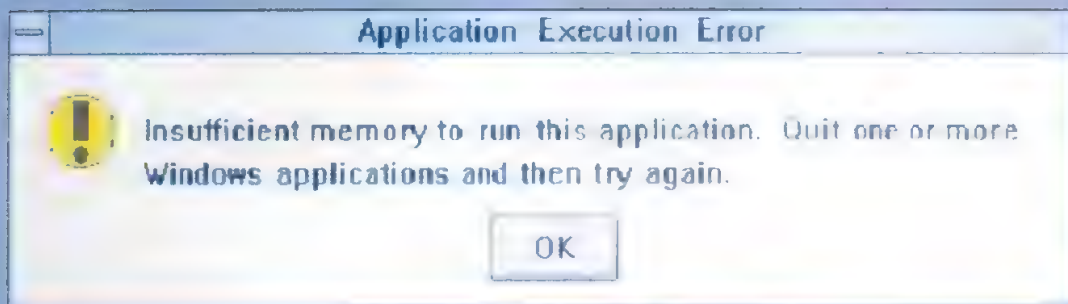


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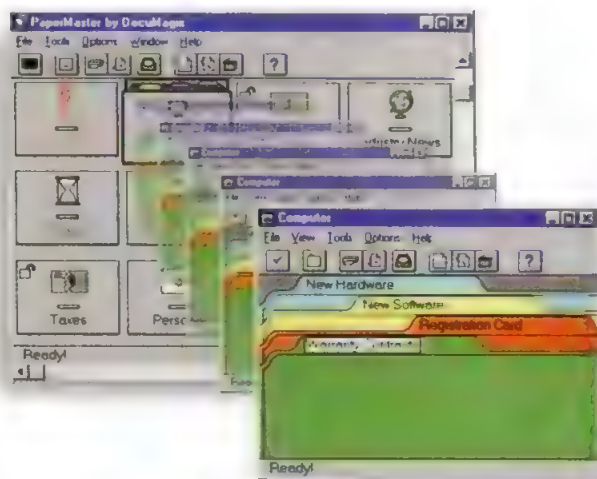
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PC Tech/Inside Windows 95

By Barry Simon

Windows 95 Shell Game

The new interface may take a while to learn, but it offers a wealth of power and flexibility.



When a jaded Windows 3.x user first lays eyes on Windows 95, its shell appears to be a mishmash of menus, icons, and cascading windows. Microsoft has merged Program Manager groups with the file system, created an entirely new type of executable, and introduced pseudo directories for printers and fonts. But you should not be discouraged by the initial confusion. Once you have grasped a few basic concepts, the Windows 95 shell becomes a lucid and powerful tool.

The concept that dominates the Windows 95 shell is a simple one: The same utilities that are used to organize your files are also used to launch them. Directories have become folders, and files have become quasi-object-oriented icons within those folders. You can access the folders via the Desktop, the Windows Explorer, or the Start Menu, but they always retain the same structure of subfolders and icons. A left-click on a file icon will open the underlying file, while a right-click will bring up a list of options.

This folder/icon metaphor is new to Windows, but it has been part of the Macintosh operating system and OS/2's Workplace Shell for years. Nevertheless, many otherwise-sophisticated Windows 95 users have trouble performing tasks as simple as rearranging icons on the Start Menu. Because Microsoft's documentation is poor on such subjects, this column will further explain the shell structure and help you customize your system for easy program launching.

THE SHORTCUT

Since the introduction of DOS 2.0, Microsoft's operating systems have had only three types of executable files: .COM programs, .EXE programs, and batch files. The Windows 95 shell introduces a fourth: the *shortcut*. A shortcut is a macro that points to a particular target and calls that target when executed. Ordinarily, each shortcut is defined by six properties: Target Type, Target Location, Target, Start In, Shortcut Key, and Run.

Application and File Folder are the two most prominent Target Types. An Applica-

tion target is an executable program (such as a word processor), while a File Folder target is a directory path (such as an A: drive). Target Location identifies the path where the target can be found (this is redundant for a File Folder shortcut), while Start In identifies the path where the target should be executed. Shortcut Key and Run indicate keyboard support and window size, respectively.

A shortcut can also point to a document that is associated with a particular application. If the target is a .DOC file, for instance, the shortcut will run Microsoft Word for Windows and then automatically open the file. The application, which is identified by the Target Type property, must be registered with Windows 95.

Many shortcuts are predefined when you install Windows 95, but you can also create your own. To do so, right-click on a file and se-

manifested as .PIF files and have different property sheets.

THE MENU PARADIGM

Windows 95 organizes shortcuts via its menu paradigm. A menu is a cascading graphical hierarchy of items. The Start Menu, which points to all your important applications and documents, and the Send To menu, which allows you to pass files to various applications, are prime examples.

Like almost everything else in Windows 95, each menu is associated with a particular folder. The folder C:\WINDOWS\START MENU, for instance, mirrors the graphical structure of the Start Menu; subfolders represent submenus, and files represent menu items. If you add a subfolder or a file to C:\WINDOWS\START MENU, a submenu or menu item will be created as well. As you parse through a menu, therefore, you are essentially parsing through the same folder tree that is in the Windows Explorer or on your Desktop. A menu's folder can contain executables or documents, but it ordinarily contains shortcuts that point to files in other folders.

THE START MENU

When Windows 95 is first installed, the Start Menu contains seven items: Programs, Documents, Settings, Find, Help, Run, and Shut Down. The latter five are hardwired into the system, but Programs and Documents are mirrored by a pair of subfolders.

Programs, which contains applications, accessories, the Windows Explorer, and other executables, is initially the lone subfolder within C:\WINDOWS\START MENU. If you wish to edit the Start Menu, you must add subfolders and shortcuts to C:\WINDOWS\START MENU. We added one menu item (Edit Start Menu) and two submenus (Control Panel and Programs) to our Start Menu, as can be seen via a Desktop folder (Figure 1) or the Windows Explorer (Figure 2).

The Documents submenu, which displays documents that you have recently opened, is contained in C:\WINDOWS\RECENT. Creating a subfolder in C:\WINDOWS\RECENT will not spawn a corresponding submenu, but you can remove files from the menu by deleting them in the folder.

EDITING THE START MENU

Windows 95 provides two ways to edit the Start Menu. The first uses a right-click on the Start Menu button (see Figure 3), while the other uses the Taskbar Properties window

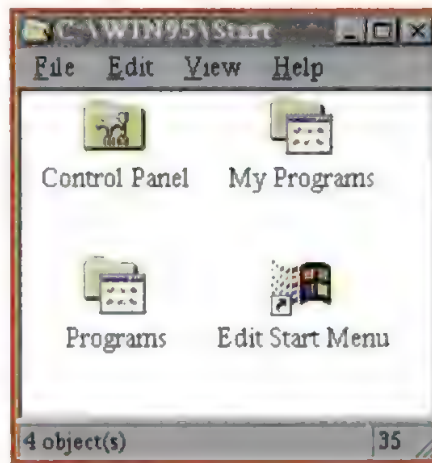


FIGURE 1: An open folder on the Desktop is run from the same executable code as the Windows Explorer.

lect New Shortcut from the resulting list of options or simply drag a file from one location to another (from Explorer to the Desktop, from folder to folder, and so on). The latter will build a shortcut in the new location that points to the file in the old location.

Windows 95 shortcuts have .LNK extensions, although the extension is normally hidden when the file is viewed with Explorer. DOS shortcuts can also be used, but they are

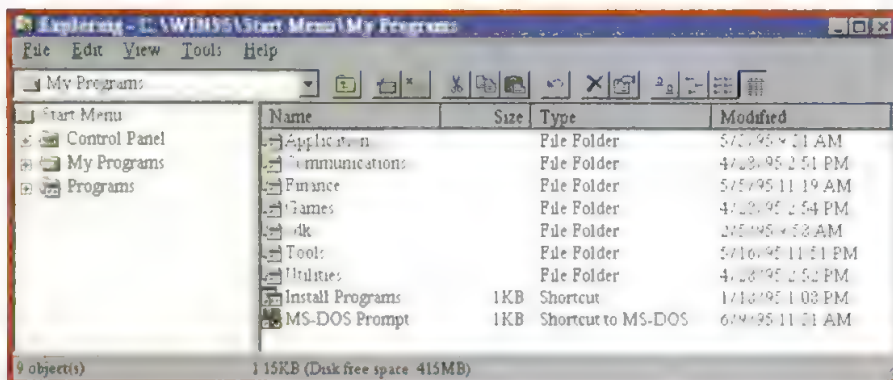


FIGURE 2: Windows Explorer lists folders in an expandable tree, then focuses on a given subfolder.

(see Figure 4). The methods offer some slight differences but are essentially redundant.

A right-click on the Start button will give you a pair of options: Open and Explore. Open brings up the Start Menu folder on the Desktop, while Explore lists the file tree via the Windows Explorer. The Desktop folder and the Windows Explorer are part of the same Explorer code; they display icons differently but offer the same set of editing tools.

You can reach the Taskbar Properties window by left-clicking on the Start button and choosing Setting | Taskbar or by right-clicking on the Taskbar and selecting Properties. The Start Menu Programs tab within this window has three editing buttons: Add, Remove, and Advanced. Add and Remove allow for simple editing of items and folders, while the Advanced button brings up Explorer for more detailed changes. This Explorer window displays only the Start Menu folder (see Figure 4), whereas the Explorer window that is launched using the first method (see Figure 3) displays your entire folder tree.

Because the Advanced button isolates the Start Menu and displays it as an easy-to-read tree, this is the best tool for editing the Start Menu. Since accessing the button requires so many mouse clicks, however, you should duplicate it as a shortcut. Figure 3 and Figure 4 display such a shortcut, which is called Edit Start Menu and uses the Windows logo.

THE EXPLORER COMMAND LINE

To input command lines manually for shortcuts like the one above (C:\WINDOWS\EXPLORER.EXE /e, /ROOT, C:\WINDOWS\START MENU), you must know Explorer's command line switches. The full syntax of the Explorer command is documented in the Windows 95 Resource Kit: EXPLORER.EXE [/n] [/e] [/ROOT,OBJECT] [/SELECT,SUBJECT].

If EXPLORER.EXE is called with no successive commands or with the /e switch, Windows Explorer is launched just as it would be from the Start Menu. If there are other commands but the /e switch is not used, the specified folder will open on your Desktop. If the folder you are trying to access is already open,

EXPLORER.EXE will not open another instance unless the /n switch is used.

The /ROOT switch specifies the top folder level that Explorer's tree will display. The default ROOT is Desktop, which includes all the files on your machine and your network (My Computer and Network Neighborhood). To change the default, follow /ROOT with an OBJECT, which is the name of a particular folder. Naming a SUBOBJECT will open Explorer to a particular subfolder beneath the ROOT; if a SUBOBJECT is not specified, then the ROOT has the initial focus. The /SELECT switch al-

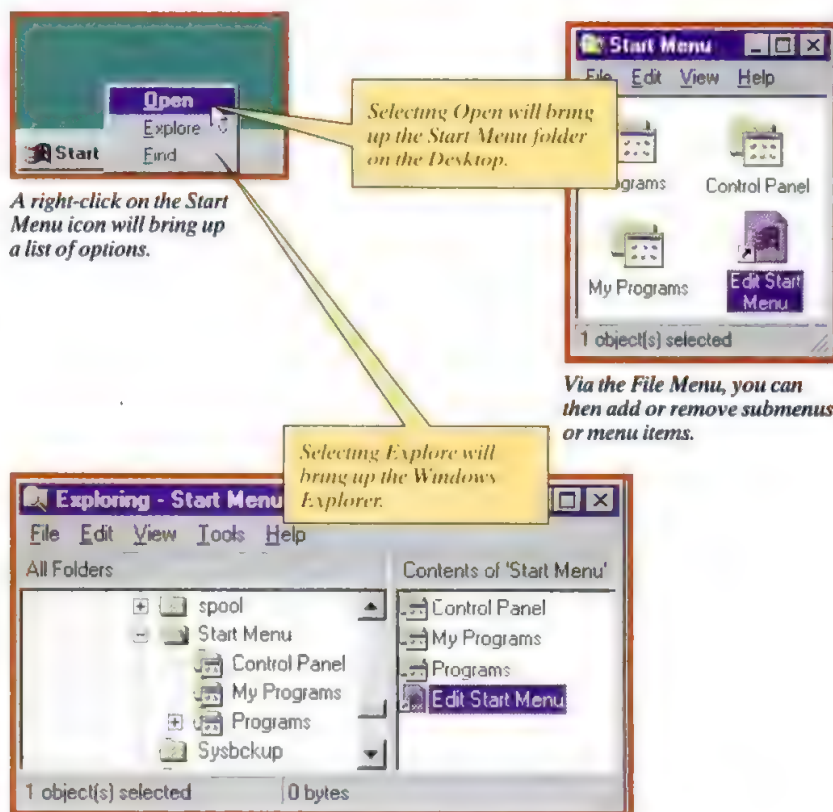
lows the SUBOBJECT to be a file rather than a folder, but you cannot use wildcards.

The filenames in an Explorer command line can be full UNC (Universal Naming Convention) pathnames, which allows access to network resources not mapped to local drives.

START MENU DYNAMIC LINKING

The Start Menu is a good way to organize your files, but being able to access them quickly from the Desktop is also advantageous. Luckily, Windows 95 allows you to put icons in Desktop folders and dynamically link them to the Start Menu.

When setting out to do this, your first inclination may be to right-click on the Desktop, create a new folder of icons, and build a shortcut to the folder within C:\WINDOWS\START MENU. But this is inadequate. The folder will reside on your Desktop, but it will not be a cascading list of icons on the Start Menu; it will be a single menu item that merely opens the folder on the Desktop again. Instead, you should add a subfolder to your Start Menu and place a shortcut to it on the Desktop. You can open the folder by double-clicking on the shortcut or by putting it in your Startup folder (which will launch the shortcut when you boot the system). When you change the



You can then add or remove items or subfolders within Explorer, which shows the entire folder tree but focuses on the Start Menu folder.

FIGURE 3: Right-click on the Start Menu for two options: a Desktop folder and the Windows Explorer.

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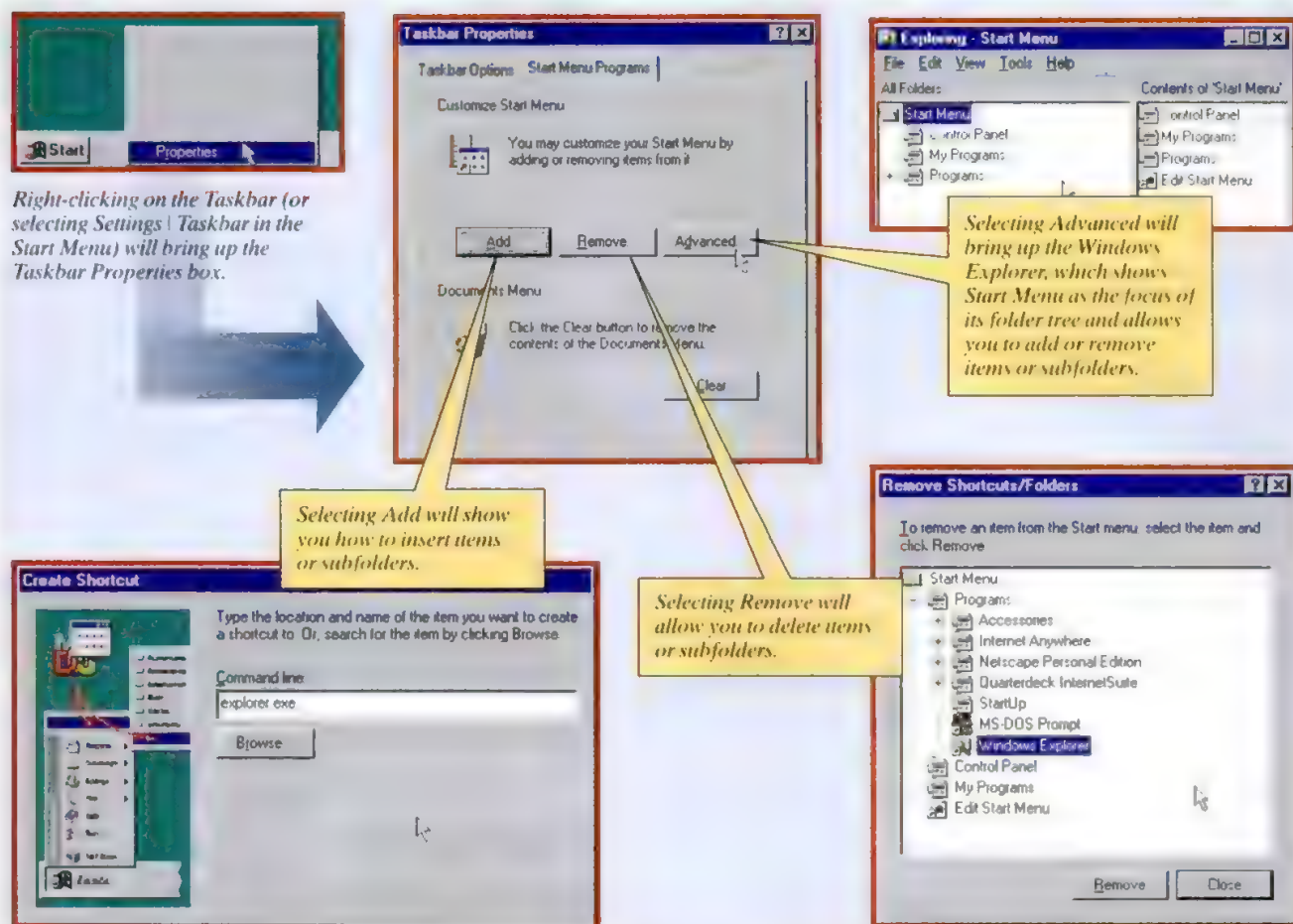


FIGURE 4: The Taskbar Properties box lets you edit the Start Menu via three applets: Create Shortcut, Remove Shortcuts/Folders, and the Windows Explorer.

folder on the Desktop, the cascading icons in the Start Menu will be changed as well.

THE DYNAMIC CONTROL PANEL

The Start Menu also offers a link to the Control Panel, but it will not let you cascade through the contents. With only a few changes to the Start Menu, however, you can create a cascading Control Panel submenu that will be automatically updated as Control Panel items are added or removed.

To create this submenu, simply add a subfolder to the Start Menu folder, call it Control Panel, and give it the following extension: {21EC2020-3AEA-1069-A2DD-08002B30309D}. If you wish to add a dynamic Printer folder or Dial-Up Networking folder, you would use {227A280-3AEA-1069-A2DE-08002B30309D} and {992CFFA0-F557-101A-88EC-00DD010CCC48}, respectively.

THE SEND TO MENU TREE

The menu paradigm is also used in a Windows 95 subfolder called Send To. When you right-click on a file in Explorer or on your Desktop, Send To is always among the resulting list of options. This submenu mirrors the items in

the C:\Windows\Send To folder.

When you choose an item from a file's Send To submenu, Windows 95 passes the file to that item. If you add a WinZip shortcut to Send To, for instance, you will be able to unzip any file with only a pair of mouse clicks. An ASCII file editor, a bitmap editor, and a word processor are also helpful applications to have in your Send To menu.

THE BATCH LANGUAGE

Shortcuts to individual applications are useful, but the Windows 95 batch language allows you to start up an entire project from a single icon. This DOS-based set of commands is not the BASIC-like macro language that Microsoft had hinted at, but it will allow you to launch multiple Windows applications, documents, and DOS sessions.

The most important command is START, which uses the following syntax: START [OPTIONS] PROGRAM [ARGUMENTS]. The two options that you will use most often are /m and /max, which open the program in a minimized or maximized window, respectively. Type START/? on a DOS command line to view a list of other options.

If PROGRAM is a DOS application, the system starts it in a new session window. PROGRAM can also be a document with a registered file extension, in which case START will run the application associated with that extension and then open the file.

If you write a batch file with several START commands and create a Desktop icon for it, you can open multiple applications with a single mouse click. The first time you launch the icon, the DOS session does not close and the word Finished appears on the title bar. If you click on Properties and select Close On Exit in the program tab, the batch file will always close in the future.

LEAVING WINDOWS 3.X BEHIND

Now that you have a road map for understanding and customizing your Windows 95 shell, the key is practice. Shaking four-year-old Windows 3.x habits is difficult, but the advantages of Windows 95 are well worth the effort. The shell is a strong, flexible tool once you learn its intricacies. □

Barry Simon is a contributing editor to PC Magazine.

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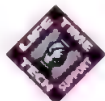
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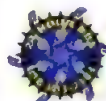
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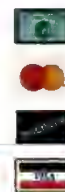
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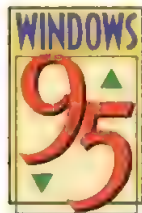


PC Tech/Inside Windows 95

By Steve Rigney

The Long and the Short of Windows 95 Filenames

Before you reap the benefits of long filenames, you need to investigate their pitfalls.



For years, short filenames have made document retrieval a nightmare. Windows 3.x users often lose important files in a sea of arcane 8.3 names and must spend valuable time tracking them down. Fortunately,

Windows 95 does not limit names to eight characters, a period, and a three-character extension (see Figure 1). File and subdirectory names under Windows 95 can have up to 255 characters, including spaces, multiple periods, and various other symbols. Before deciding to rename all of your old documents, however, you need to examine the potential pitfalls of long filenames. Depending on naming habits, installed applications, and network configuration, long filenames may be more of a challenge than a blessing.

Long filenames are not a new invention. Other 32-bit operating systems—including IBM's OS/2 and Microsoft Windows NT—have offered extended name support for years. Windows 95, however, is the first mass-market operating system to include long names that are backward-compatible with the FAT 8.3 name space. After a 32-bit Windows 95 application saves a document with a long filename, a 16-bit application can still access it via a separate short name. In theory, the 16-bit program can open the document, make changes, and resave without any ill effects. In reality, the process does not always work this well.

THE VFAT FILE SYSTEM

Before examining the advantages and disadvantages of long filenames, you need to understand how and why they work. Support for long filenames in Windows 95 stems from Microsoft's new file system, VFAT (Virtual File Al-

location Table), a 32-bit version of the old DOS file system, FAT. Because VFAT is based on its DOS predecessor, it is compatible with existing FAT-formatted hard disks. Thus, Windows 95 installation does not need to reformat disk space that once housed DOS and Windows 3.x.

VFAT was first available with Microsoft Windows for Workgroups 3.11, but it did not support long filenames until its integration with Windows 95. To make its long filenames compatible with older 16-bit applications, however, Windows 95 also introduced support for *aliases*. Each time the user creates an extended name, Windows 95 automatically generates a separate 8.3 alias. If a 16-bit application attempts to access a file that has a long name, it will see the truncated alias, open the

document, and allow you to make changes. All changes will be reflected when you access the document with its long filename.

Although VFAT is a welcome feature for users who are upgrading from Windows 3.x to Windows 95, it has some inherent drawbacks. Most notably, VFAT (like FAT) cannot easily address disk drives larger than about 2GB. In contrast, the Windows NT file system, NTFS, can handle millions of gigabytes without difficulty. VFAT can also restrict the number of files and subdirectories on the root of your disk drive. FAT-formatted disk drives are limited to 512 entries in the root directory. Since Windows 95 creates an alias for every file or directory name, however, only 256 long entries can fit onto the root of a VFAT drive at most. This may seem like a comfortable figure, but directories tend to grow at alarming rates.

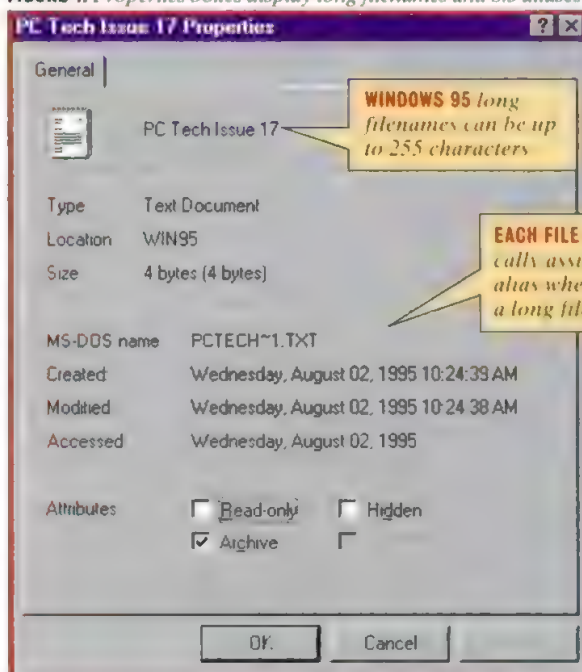
NAMING CONVENTIONS

Even with Windows 95's file system enhancements, creating unique filenames can be difficult. If you still use applications that rely on 8.3 names (as practically all of us do), VFAT's method for generating aliases may cause difficulties.

Windows 95 automatically creates an alias using the first six characters of the long filename, a tilde symbol (~), and a numeral (see Figure 1). This seems adequate, but it can create some minor confusion. For instance, if you generate a company sales report every month, you might use the following naming convention: Status Report for Oct, Status Report for Nov, Status Report for Dec, and so on. From these long names, Windows 95 would automatically create the following short aliases: STATUS~1, STATUS~2, and STATUS~3. So with a DOS or Windows 3.x application, finding the correct month would become troublesome.

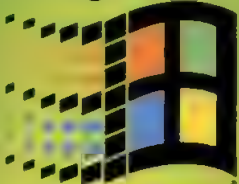
Fortunately, this naming problem is easy to correct—just begin each string with the unique portion of the filename rather than the shared portion. So replace Status Report for Oct with Oct Status Report and the alias retains the correct month. To keep aliases lucid, network administrators should create a list of naming conventions for their sites. This will eliminate any confusion that develops when files are accessed using both 16- and 32-bit applications.

FIGURE 1: Properties boxes display long filenames and 8.3 aliases.



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PC TECH

Inside Windows 95

LONG FILENAMES OVER NETWORKS

All network nodes are not created equal. PCs, applications, and even operating systems on a network can vary from workstation to workstation. Because networks are so eclectic, you should do some investigating before using long filenames on your shared drives.

Windows 95's implementation of long filenames will work on most network operating systems, including Windows NT and Novell's NetWare. The process works flawlessly over a Windows NT network, but you will need to make a few changes if you want to use long filenames on a NetWare server.

By default, NetWare does not let you store Windows 95 long filenames, but it can be configured to support them for Macintosh and OS/2 clients. Fortunately, Windows 95 is compatible with NetWare's support for OS/2 long filenames. Making the configuration changes to the NetWare server is fairly simple: Once you type the Load OS2 Name Service and Add OS2 Name Service To Volume Name commands, the network operating system (NOS) does the rest of the work for you. The name service, however, is slow to load and will sap several megabytes of server disk space.

The disk space problem gets worse as you start adding long filenames to the NetWare server. Each file you create requires an entry in the NOS's FAT table as well as the HPFS table. Therefore, when you save a long filename on your NetWare server, the OS must generate two 128-byte file entries. If you wish to remove long filename access from your NetWare server, you will have to call the Vrepair utility and delete all non-DOS files from your server's volume. This is a fairly simple process, but most network administrators get nervous about using Vrepair to delete anything.

DOS/WINDOWS 3.x ON THE NETWORK

Network PCs running Windows 3.x pose the greatest threat to long filenames. In our testing, we used the beta version of Microsoft Word for Windows 95 to create a document on our NetWare 4.1 file server. We saved the file with the name Document for PC Mag Test.doc, closed the file, and moved to a Windows 3.1 PC. On this machine, we reopened the file using Microsoft Word 6.0, which recognized the 8.3 name (DOCUMENT.DOC). After making several changes to the document, we saved it back onto the network. When we tried to open the document on our Windows 95 machine, however, the long filename had been deleted and only the 8.3 alias remained. We attempted to retrieve the name using NetWare's Salvage utility, but Salvage does not work with long filenames.

This problem arises only when a DOS or Windows 3.x machine is introduced. If we run the test between two Windows 95 machines or a Windows 95 machine and a Windows NT machine, the long name stays intact after the

file is used by Word 6.0. Unfortunately, not every PC on your network will have the resources to run Windows 95 or Windows NT. It may not be practical to upgrade dozens of PCs that are used solely for word processing, but you will have to if you want long filenames on your network.

BACKUP AND DISK UTILITIES

Most intelligent PC users rely on backup packages to protect their data and on disk management utilities to protect their drives. Unfortunately, both can cause problems with Windows 95 filenames.

If you use a standalone PC and a low-end tape backup device such as Colorado's Jumbo, you may not be able to back up and restore your long filenames. Should this be the case with your vendor, you could not only lose your directory structure but also important data. On the other hand, high-end products such as Cheyenne's ARCserve or Palindrome's Storage Manager can easily back up long filenames on a network.

Many of the popular disk utilities do not work under Windows 95 either, including Symantec's Norton Disk Doctor, Central Point's DiskFix, and even Microsoft's DOS-based Checkdisk and Scandisk programs. If you use these applications, you could lose your long filenames.

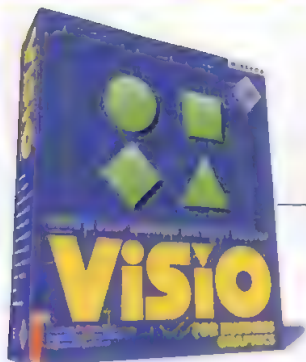
Until vendors provide Windows 95 versions of their backup software and disk utilities, you will need to use a Windows 95 program called LFNBK (Long Filename Backup). LFNBK allows you to store long filenames and replace them with their 8.3 aliases. Once you run your backup program or disk utility, LFNBK will restore all long names to the appropriate files.

THE LONG AND THE SHORT

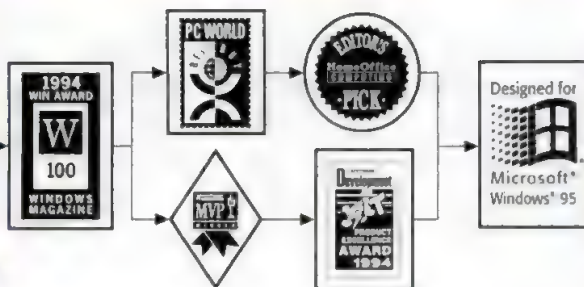
Windows 95 is a new product, and it may be a while before there are 32-bit versions of all your favorite applications. In fact, some vendors may not even upgrade to 32-bit if their products work in 16-bit mode under Windows 95. In short, many of your applications will not support long filenames. Aliases, however, will adequately solve this problem if you use a standalone PC that does not trade data across a network, modem, or removable media.

In networked situations, you need to make sure that all network applications either support long filenames or are running 16-bit applications under Windows 95 or Windows NT. Otherwise, you could encounter problems as harmless as losing your filename or as disastrous as losing your data. Support for long filenames under Windows 95 is a useful feature, but there are many scenarios in which it may fail to work. □

Steve Rigney is a contributing editor to PC Magazine.



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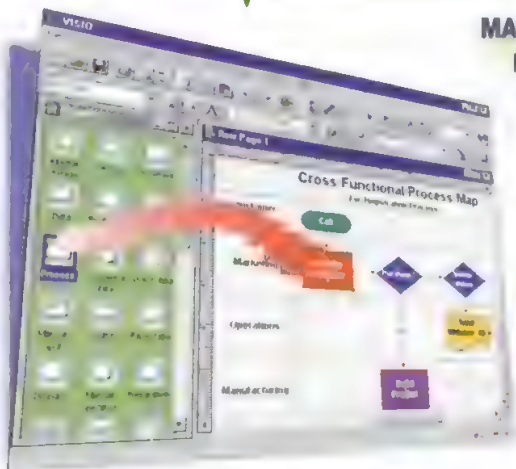
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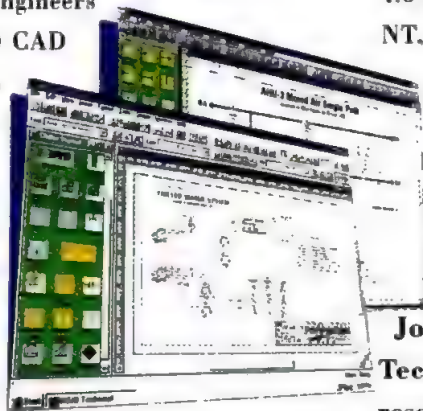
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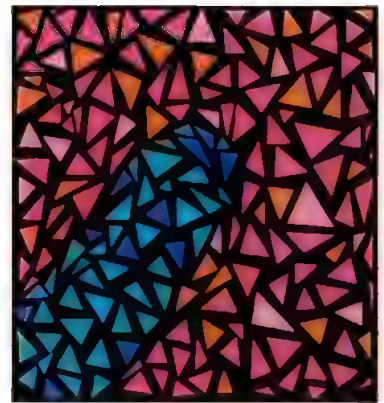
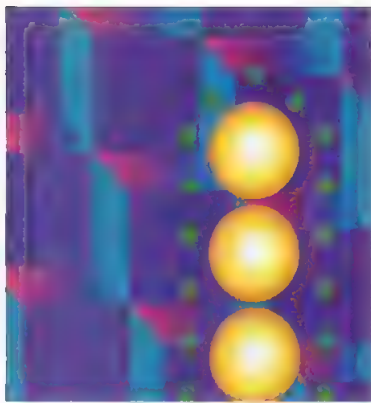


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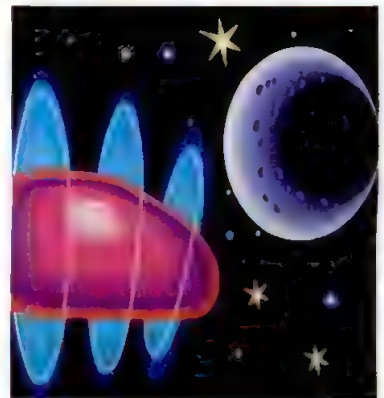
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Windows 95 Compatible



PC Tech/ Inside Windows 95

By Steve Rigney



FIGURE 1: When you install Windows 95, select the Portable option to install the mobile-computing utilities automatically.

meaning the OS can determine a file or application's origin—is one of the most innovative features in Windows 95. When you select a file or an application stored on a network resource, Windows 95 checks each of the connection methods to see which one is activated. If you are not connected, the OS automatically should establish a connection.

If you have multiple connection methods installed, such as dial-up, network, and direct cable connections, Windows 95 tries each method until it successfully connects to the desired resource.

Before you can take advantage of the implicit connection features, you must install the different connection methods you will use. The easiest and most logical way to do this is to choose the Portable setup during the installation (see Figure 1); Windows 95 should automatically install the Dial-Up Networking, Direct Cable Connection, and Briefcase utilities. If you perform a custom or desktop installation, you will have to select manually the mobile features you wish to install. You can always add or remove these utilities later.

DIAL-UP NETWORKING

Remote access will likely be the most popular mobile feature in Windows 95. In a dial-up connection, also called a *remote-node* connection, the mobile computer simulates a LAN connection, usually over an analog phone line. A user dials a server at the office with remote-node software that encodes network protocols such as TCP/IP into more efficient packets. Other than slower network response because of the remote connection, users work exactly as if they were hooked up in the office.

Windows 95 comes with all the software you need to establish a connection to several remote-access servers: Windows NT Remote Access Services (RAS), Novell's NetWare Connect, and Shiva Corp.'s LanRover and NetModem. You can also connect using different network protocols—including TCP/IP, IPX, and NetBEUI—and the SLIP and PPP remote-access protocols. While Windows 95 cannot be set up as a multiuser dial-up server, the separately sold Microsoft Plus! CD-ROM includes Dial-Up Server, a single-port version of RAS. See the sidebar "Microsoft RAS: Simple Remote Access" for more on Remote Access Services products.

The One for the Road

The first mobile-aware operating system keeps you connected without tying you down.



If you're like most notebook users, you have several different configuration settings on your PC for wherever you're currently working. You may boot one configuration to dial in from the road, another to transfer files between your notebook and desktop, and yet another to connect to a network directly. These different configurations usually require a detailed knowledge of the operating system, and you have to reboot your PC each time you want to switch a connection.

Your life as a mobile computer user is about to become easier. Microsoft Windows 95 has a number of utilities that make it the first "mobile-aware" OS—expect it to pick up and go whenever you do. These new features, most of which are optional to install, include the Dial-Up Networking, Direct Cable Connection, and Briefcase (for file synchronization) utilities; deferred printing; hardware

auto-detection; and power management. All of these utilities let you work on the road in virtually the same way as when you're connected to a LAN.

MULTIPLE CONFIGURATIONS

Users have always been able to connect under multiple configurations—except that under DOS or Windows 3.x, you have to reboot your PC for those changes to take effect. Windows 95 allows you to use several different configuration settings and use any of them without restarting your PC. For example, if you use an external monitor when in the office, you might need a different video driver from the one you use with your notebook screen. Windows 95 can detect the type of monitor you are using and load the correct driver automatically; alternatively, you can use the Control Panel to create different settings for different environments manually.

The concept of *implicit connections*—



FIGURE 2: The Dial-Up Networking Wizard takes you through the steps of configuring a new connection. The Wizard selects an installed modem or will search for one if none has been set up.

If none of the included software meets your needs, you can always use third-party Windows 3.1-based remote-access software with Windows 95, such as Microcom's LAN-express for remote-node connections and Symantec Corp.'s pcAnywhere for remote control. But unlike other current Windows-based remote-access client software, all the dial-up clients in Windows 95 are true 32-bit applications.

The built-in Windows 95 communication tools also conform to the Microsoft Telephony API (TAPI), a set of instructions that controls all of a PC's communication functions. Without a standard such as TAPI, all communication software requires a specific

initialization setting for each different modem. Unfortunately, with hundreds of modems, it is impossible for every application to know about every different modem. In the same way that Windows 3.x provides a common printer-driver interface, Windows 95 uses TAPI to gather all of the device information and make it accessible to applications. TAPI takes a lot of the guess work out of using different modems with different applications.

The Dial-Up Networking information is extremely easy to set up and configure with Windows 95's connection wizard (see Figures 2, 3, and 4). When you start it, the connection wizard automatically looks for a



FIGURE 3: When you configure Dial-Up Networking, Windows 95 considers whether you're making a local or long-distance call and adds the area code or any dial-out code necessary.

modem, then prompts you for a phone number, the type of server you are calling, and user information such as name and password. You can create multiple connection shortcuts for multiple servers. The connection wizard lets you set up your area code and any numbers you need to dial to access an outside line. Windows 95 considers whether you're making a local or long-distance call and adds the area code or any dial-out code necessary.

Microsoft is also working on a scripting language for PPP and SLIP connections. With it you should be able to generate scripts that will automatically launch connections to Unix and other PPP servers.

Microsoft RAS: Simple Remote Access

By Steve Rigney

Microsoft's Remote Access Services (RAS) server software—which allows you to set up a server for remote users to dial in and access a LAN—has one benefit that competing products don't have: It's practically free. You still need to purchase the hardware, of course, but Microsoft bundles RAS with Windows NT Server and Workstation and Windows for Workgroups (WfWG). (The RAS server for Windows 95 is sold separately.) It's a convenient and reliable solution, but RAS does not offer the advanced management and dial-out features of other remote-access servers.

The different flavors of RAS have different capabilities. WfWG includes a 16-bit, single-port version of RAS that is limited to the NetBEUI protocol on the dial-up connection. The 32-bit RAS Dial-Up Server included on the Microsoft Plus!

CD-ROM for Windows 95 also supports just one dial-up connection at a time. Though it supports IP, IPX, and NetBEUI network protocols, it cannot route IP to connect to the Internet.

Much more powerful, the Windows NT Server includes the full 32-bit version of the RAS server, which can support up to 256 simultaneous dial-in users. The NT RAS server can use TCP/IP, IPX, and NetBEUI protocols. Once dial-in users connect to a network, they can access any other network services to which they have access rights and use the PPP or the SLIP protocol to connect to a Unix host. Unfortunately, RAS does not offer any dial-out capabilities, which allow network users to share a pool of modems.

All the versions of RAS are compatible, and you can use the RAS client software that's included with WfWG or Windows 95 to connect to a Windows NT 3.51

RAS server.

Because the RAS server is tied into Windows NT Server, you can manage and monitor it using all of the OS's built-in utilities, such as Performance Monitor and Event Viewer, and you can administer the server remotely. But you get what you pay for: RAS does not provide the same powerful management features found in other access servers, such as Shiva's LanRover and Microcom's LAN-express. Also, Microsoft does not provide DOS or Windows 3.1 RAS client software, which could exclude a large installed base of users.

If you need to track management information, such as port statistics and user-access audit logs, you should consider another product. But if you already have a Windows NT Server on your network, RAS is an inexpensive and reliable solution.

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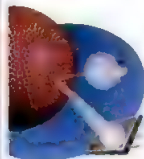
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Dial-Up Networking in Windows 95

Call setup. Through TAPI, the Dial-Up Networking software in Windows 95 initializes the modem and dials the remote-access server that is attached to the network.

Remote-access server. At the other end of the phone link, the remote-access server checks the security of the

dial-in user and can call back the user for added security. The server, which can be NetWare Connect, Shiva's LanRover and NetModem, or Windows NT RAS, decodes the PPP (or other remote-access protocol) data and routes the network protocol to a network server.



Remote-access protocols. Once the physical connection is made, Windows 95 negotiates access using (as a default) the Point-to-Point Protocol (PPP), which checks link integrity, verifies passwords, and defines the

way in which TCP/IP, IPX, and NetBEUI are transferred over the phone line. While PPP is the recommended standard, Windows 95 also can use the NetWare Connect, RAS, or SLIP remote-access protocol.



Windows 95 dial-up server. Your own Windows 95 desktop system can be configured as a single-port dial-up server. The RAS server software will be included on the Microsoft Plus! CD-ROM (sold separately).

DIRECT CABLE CONNECTION

Not every mobile computer user has a network or a remote-access server. For a much simpler networking solution, Windows 95 includes a direct cable option that lets you connect two PCs with a serial or parallel cable and then transfer files and share resources such as disk drives, CD-ROMs, and printers.

In addition to working with any null-modem RS-232 serial cable, the Direct Cable Connection option works with the following parallel cable types: standard 4-bit cable (such as that included with Traveling Software's LapLink); 8-bit Extended Capabilities Port (ECP) cable, which you need to enable in the BIOS; and Universal Cable Module cable, which can connect different kinds of parallel ports.

To establish a direct connection, you install the Direct Cable Connection software on both PCs, selecting the host option on the server PC and the guest option on the client (see Figure 5). Once you connect to the host PC, you can access all of that PC's files and other resources.

A direct cable connection is not as fast as a network connection—the actual throughput speed with 4-bit parallel cables is about 600 Kbps—but you should expect speeds of up to 4 Mbps using ECP-enabled cables and adapters. Parallel connections are faster than serial cables (which are limited to 115.2 Kbps), but a parallel cable can be only 15 to 20 feet in length compared with 50 to 100 feet for a serial cable.

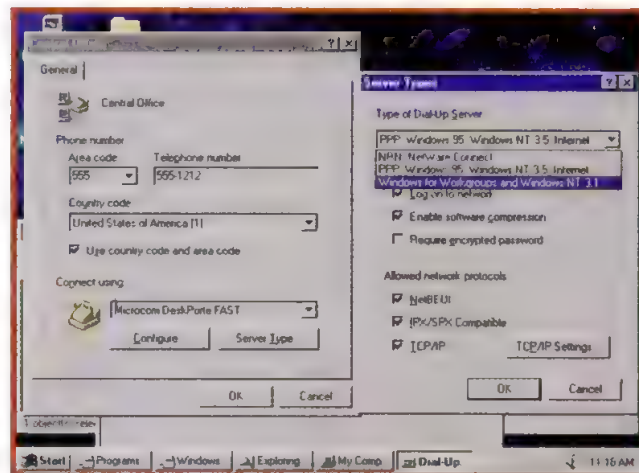


FIGURE 4: You can modify an existing connection and set up parameters for the type of remote-access server you're dialing.

FILE TRANSFER: THE BRIEFCASE

After you've set up the cable connection, you can quickly update the data you need by using the Briefcase. Like other file-transfer and synchronization utilities, the Briefcase allows you to transfer files between two PCs using either a network connection, a direct cable connection, or disks.

The Briefcase appears as a file folder on the desktop. When you want to transfer a file or synchronize a file with another PC, all you do is drag-and-drop the file into the Briefcase folder. You can create as many different Briefcase folders as you like. After you have moved the files to the Briefcase, you establish a connection to the destination PC via network or direct cable, or you insert a disk into the PC's drive. You then select the proper Briefcase folder and use the Update All button on the toolbar. The files are automatically copied to their new location. The Briefcase includes a status column that indicates which files are going to be copied (see Figures 6 and 7).

In addition to transferring files from one PC to another, the Briefcase can also synchronize the entire contents of a disk drive or a subdirectory. The synchronization feature compares the size and date stamp of a set of files and copies the newest versions of your data. Unlike LapLink, which includes a delta-file transfer feature that transfers only the changes in a file, the Briefcase cannot merge the data between two files; it can only overwrite old files with newer versions. If you are on the road, you can store data in the Briefcase, and the file transfer or synchronization should occur the next time you connect to the target PC.

OTHER MOBILE FEATURES

Beyond the main components of Windows 95's mobile utilities are several other nice touches: Plug and Play hardware detection, deferred printing, power management, a multiformat document viewer, and disk compression.

Plug and Play. Unlike desktop PC users, mobile PC users are constantly switching between a modem connection and a direct or network cable connection. This constant changing requires a lot of different hardware and software configurations to make the hardware work. Windows 95, through the Plug and Play specification, is designed to detect different types of hardware you might use in your notebook and perform all the configuration work for you—an ease-of-use development that many long-suffering road warriors will appreciate.

Like IBM's OS/2 Warp, Windows 95 includes the Card and Socket Services for PC Card (formerly

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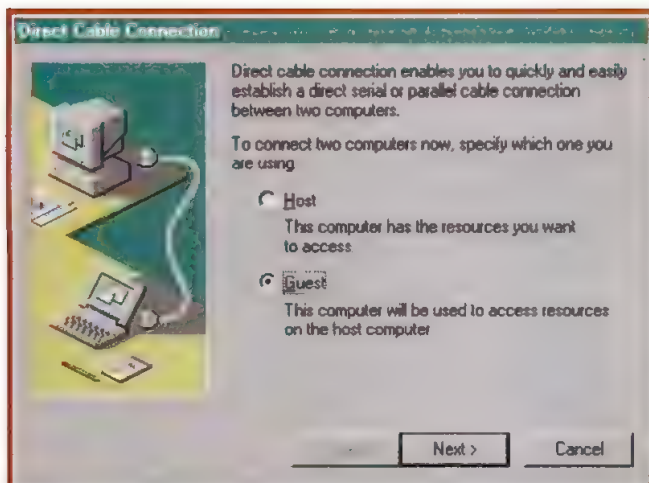


FIGURE 5: A wizard guides you through a Direct Cable Connection in step-by-step menus and lets you password-protect the host system.

PCMCIA) adapters. The built-in Card and Socket Services should allow Windows 95 to detect a PC Card modem or network adapter automatically and load the drivers when it is plugged into your notebook. This would allow you to hot-swap multiple PC Cards without rebooting your PC. For example, when you insert your PC Card network adapter, Windows 95 should automatically detect the new card, load the proper network and card drivers, and even prompt you for your network login name and password.

In addition to auto-sensing PC Cards, Windows 95 can also detect docking stations from different PC vendors. When you insert your notebook PC into your desktop docking station, Windows 95 should automatically load the required drivers, such as video, network, modem, and keyboard. Windows 95 can also detect when you remove your notebook from the docking station; the Windows 95 Taskbar even includes an eject button that can automatically disengage your notebook PC.

When you disconnect your PC from the network or remove it from the docking station,

you might establish a dial-up connection and print the documents remotely for retrieval later or save the documents until the next time you are in the office. With Windows 95's deferred printing, you can simply print the data as if you were connected to the network and Windows 95 should store the print jobs until you are connected. You can store as many print jobs as your disk space allows. To use the deferred printing feature, you need to select the Work Offline option in the printer folder.

Deferred printing is a nice feature for mobile computer users who go into the office for short periods of time. For example, if you are in the office for only a few minutes in the morning, you might forget to print out an important contract for a meeting later in the day. With deferred printing, Windows 95 should automatically print your documents as soon as you connect to the network or another desktop PC.

Power management. Battery life is one of the most important considerations for users of portable PCs. To help maximize your

Windows 95 should automatically unload any drivers that were in use when connected. After the drivers are unloaded, your system will have access to the memory that was being used by the network or modem drivers. This is a great feature, especially on systems for which available memory is at a premium.

Deferred printing. Another simple but useful mobile feature in Windows 95 is deferred printing. When you are on the road and need to print a

computing time, Windows 95 includes a power-saving feature that should automatically put your PC in sleep mode after a set period of inactivity. The power-management utility will also disable certain application features that can quickly drain the life from your battery, including automatic document backups.

The Windows 95 power-management features are based on the Advanced Power Management (APM), Version 1.1, specification. Microsoft also provides a set of power-management APIs that allow vendors to write applications that are aware of your PC's power status. Let's say your battery is almost dead: The application might prompt you to save the document you are working on and exit the program. Some applications may actually save your document for you if you are away from the PC.

File viewer. Another useful mobile feature is the Quick View file-viewing utility. Quick View lets you view multiple file formats without having to launch the application that created them. For example, you can use Quick View to view documents, spreadsheets, and even graphics files. If it does not recognize a file type, Quick View should display the file with the default format, ASCII text. The Quick View utility is ideal if you are constantly exchanging different types of information with others and don't want to waste time launching an application just to view a single attachment.

Disk compression. In addition to draining batteries, mobile users must deal with limited disk space on their notebook PCs. Unlike desktop PCs that typically can have a 1GB disk drive, most notebooks come with only 200MB to 500MB of disk space. To cover this mobile computing problem, Microsoft included a disk-compression utility in the OS. Like MS-DOS 6.22, Windows 95 includes the DriveSpace compression utility. Unlike the DOS version however, the Windows 95 version of DriveSpace includes 32-bit code that

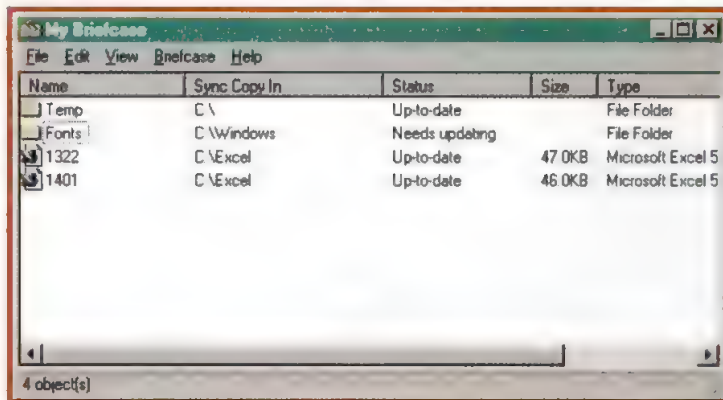
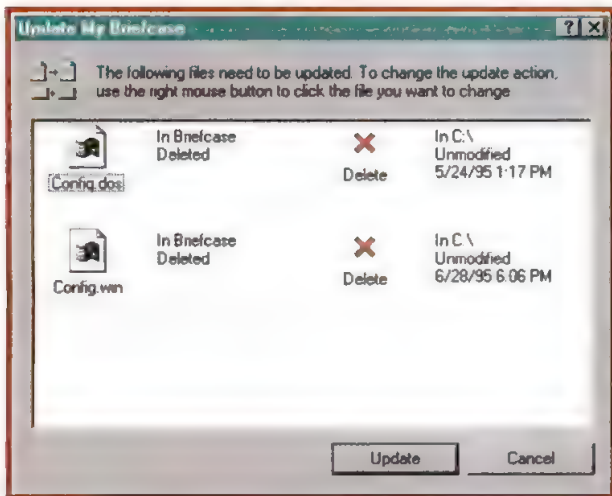


FIGURE 6: Use the Briefcase to synchronize files, folders, or entire disk drives. The status line lets you know when an item needs updating.

FIGURE 7: After you select Update All from the menu bar, the Briefcase compares the items against the source files and lets you decide how to proceed.

is integrated with the file system, providing a big performance boost.

Other improvements in DriveSpace include the ability to create your system paging files (or swap files) on a compressed drive. DriveSpace is compatible with other compression utilities, including DoubleSpace, the utility in earlier versions of MS-DOS 6.x, and Stac Technology's Stacker compression software.

DOWN THE ROAD

Microsoft is planning to add a wireless infrared (IR) connection capability to Windows 95 about 60 days after the OS ships. The ability to connect to other PCs and printers without using cables or a modem eliminates even more hardware hassles for mobile computer

Microsoft is planning to add a wireless infrared connection capability to Windows 95, which would eliminate even more hassles for mobile computer users.

users. An infrared connection would let you link to other PCs and printers simply by placing your notebook within close range of the other device. The OS would automatically detect the other infrared devices, install the proper network or printer drivers, and prompt the user for information such as user name or password.

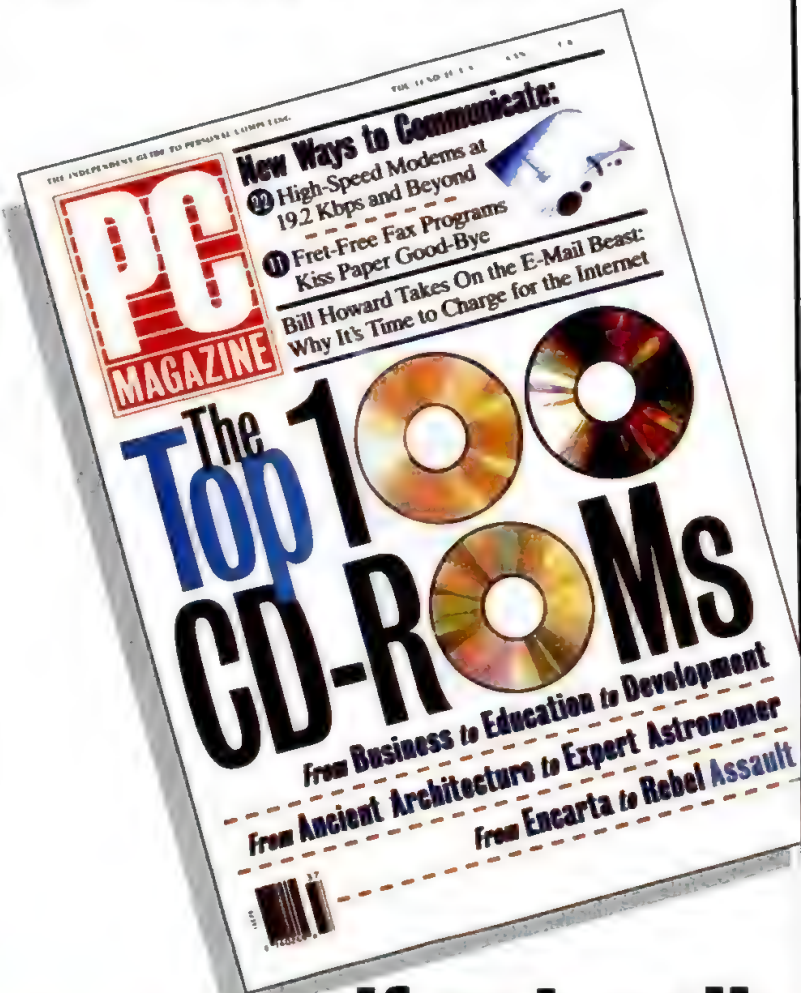
Windows 95 IR capabilities will conform to the IrDA (Infrared Data Association) standards, so you should be able to connect to any IR device that follows the specification. Other software products also work with infrared and other wireless connections.

While you can use third-party products to accomplish most of the mobile communication tasks included with Windows 95, it is convenient to have all these features built in to the OS. And because the installation program lets you check off which programs you want to keep, you can easily substitute your favorite third-party utility or remote-access software. Whether you dial in to a remote-node server or just use the Briefcase to transfer files via disk, Windows 95 is well-equipped for the mobile user. □

Steve Rigney is a contributing editor to PC Magazine.



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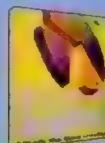
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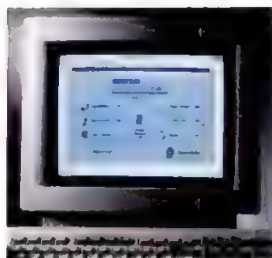
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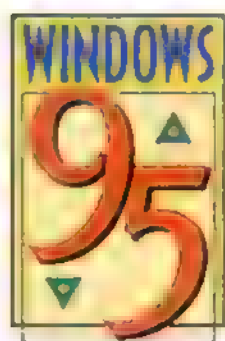


PC Tech/Power Programming

By Jeff Prosise

Transparent BitBlts in Windows

How to get nonrectangular bitmaps into a device context, including a class derived from CBitmap that does it for you.



If you're a Windows programmer, you're no doubt familiar with the mighty BitBlt function. It's the Windows API function programmers use to transfer, or *blit*, a block of pixels from one location to another. But BitBlt has one notable limitation: It works with rectangular regions of pixels, so blitting a nonrectangular image to the screen without disturbing the background is not a straightforward task.

To display a bitmap on the screen, a Windows programmer selects the bitmap into a memory device context (DC) and blits the memory DC to a screen DC. BitBlt supports 256 different raster-op codes, which describe how source and destination pixels are combined. These codes make a wide range of effects possible, from simply copying the bitmap's pixels to the screen to combining the source and destination pixels with a brush pattern. But search as you may, you'll never find a raster-op code that magically blits certain colors while leaving the background color untouched. You can't, for example, designate all the red pixels in a bitmap image as "transparent" so that they won't show up when the image is transferred to the screen. If it's transparent pixels that you want, you'll have to go to greater lengths to get them.

In this installment of Power Programming, we'll look at two ways to display bitmaps that have transparent pixels. One of the methods is specific to Windows 95 and the other works with all versions of Windows. After examining both methods, we'll extend the MFC CBitmap class with a handy DrawTransparent function that draws bitmap objects on the screen and allows any single color to be designated as transparent.

TRANSPARENT BITBLTS: METHOD 1

The first method for performing transparent BitBlts works only in Windows 95. It involves an *image list*, one of the new Windows 95 common controls provided in COMMCTRL.DLL. (Image lists are also supported in Windows NT 3.51, so you can use this method on

any up-to-date Win32 platform.) An image list is a collection of like-sized bitmapped images. Individual images in the image list are referenced by index, and a handy ImageList_Draw function lets you transfer an image to a screen DC with one simple function call.

There are two types of image lists: *masked* and *unmasked*. Images in an unmasked list are simple bitmaps created from Windows bitmap objects. Images in a masked image list are stored as two bitmaps: a monochrome AND mask and a color XOR mask. In the AND mask, 1s represent background pixels and 0s represent pixels in the image. In the XOR mask, background pixels are represented with 0s and image pixels with values denoting pixel colors. By setting background pixel values to 1 in the AND mask and 0 in the XOR mask, one can simulate transparent pixels in the image.

This works because ANDing any value with 1 and XORing it with 0 leaves the original value unchanged. To draw a masked image on-

screen, Windows first logically ANDs the values in the AND mask with the pixel values in the destination DC. This creates a "hole" for the image composed of pixels with color values of 0. Then Windows XORs the values in the XOR mask to the destination DC, filling in the hole left by the AND mask and setting all the 0 pixels to the image colors. This is standard stuff described in any entry-level graphics programming course. It's also the technique that Windows uses to draw icons and mouse cursors on the screen. To demonstrate this concept, Figure 1 shows how a pair of simple AND and XOR masks can be used to draw a filled circle.

The beauty of using an image list is that you don't have to create the AND and XOR masks yourself. Rather, if you supply a bitmap and designate any one color in it as transparent, Windows will create the masks for you. (You can also supply the masks yourself or supply an icon image that is already masked, but neither option is relevant here.) Image lists are

Drawing with AND and XOR Masks

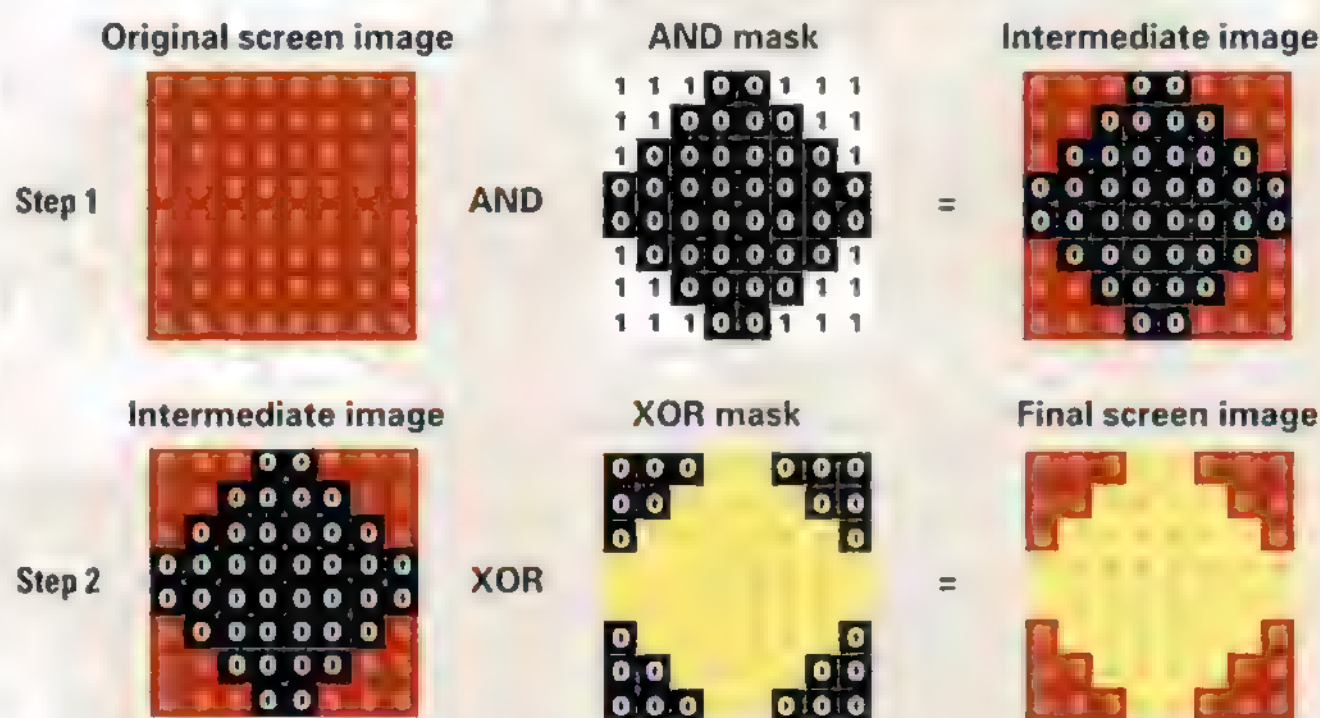


FIGURE 1: AND and XOR masks are often combined to render nonrectangular images on the screen without disturbing background pixels. The 1s in the AND mask correspond to transparent pixels in the image and leave screen pixels unchanged, while 0s carve out a

silhouette of the image by setting screen pixels to 0. The XOR mask draws the image into the "hole" left by the AND mask. The 0s in the XOR mask, which correspond to transparent pixels in the image, do not affect the underlying screen pixels.


```
HDC hdcAnd, hdcXor;
HBITMAP hOldBitmapAnd, hOldBitmapXor;

hdcAnd = CreateCompatibleDC (hdc);
hOldBitmapAnd = SelectObject (hdcAnd, hBitmapAnd);

hdcXor = CreateCompatibleDC (hdc);
hOldBitmapXor = SelectObject (hdcXor, hBitmapXor);

BitBlt (hdc, x, y, cx, cy, hdcAnd, 0, 0, SRCAND);
BitBlt (hdc, x, y, cx, cy, hdcXor, 0, 0, SRCINVERT);

SelectObject (hdcXor, hOldBitmapXor);
SelectObject (hdcAnd, hOldBitmapAnd);

DeleteDC (hdcXor);
DeleteDC (hdcAnd);
```



TRANSPARENT BITBLTS: METHOD 2

The second method works across the entire spectrum of Windows platforms. It involves some grungy code, but I'll prevent you from having to write it yourself by providing a canned implementation in a class derived from MFC's CBitmap class.

Given an AND mask and an XOR mask to work with, you can simulate the drawing of a masked image from an image list by blitting the AND mask to the screen with the raster-op code SRCAND, followed by the XOR mask with the raster-op code SRCIN-

VERT. Assuming hBitmapAnd represents the AND mask and hBitmapXor represents the XOR mask, the code in Figure 2 creates a pair of memory DCs, selects the bitmaps into them, and BitBlts them to the screen DC with the handle hdc at the location specified by x and y.

The problem, of course, is that it's up to you to provide the AND and XOR masks. An image list generates the masks automatically. But image lists don't exist in 16-bit Windows, and they aren't supported in versions of Windows NT prior to 3.51. The secret to method number 2 is that with some clever coding, it's possible to write a routine that takes a bitmap and creates AND and XOR masks that mask out a certain color. Best of all, the routine requires no pixel-level manipulations. Rather

than scanning the bitmap pixel by pixel and manually building the masks (a tedious process as well as a slow one), you can creatively use the BitBlt function and have it build the masks for you.

Here's a brief outline of the steps involved in blitting a bitmap so that pixels of a chosen color are transparent in the destination DC:

1. Create a memory DC and select the bitmap into it. We'll refer to this DC as the *image* DC.

2. Create a second memory DC that is identical to the first and use BitBlt to copy into it the image from the image DC. We'll call this DC the XOR DC, because it will hold the bitmap's XOR mask.

3. Create a monochrome memory DC (the AND DC) and create an AND mask inside it. To do this, set the background color of the image DC to the color that should be transparent and blit from the image DC to the AND DC using the SRCCOPY raster-op code. Because the AND DC is monochrome, transparent pixels in the bitmap (pixels whose color equals the image DC's background color) will be transformed into 1s in the AND DC, and non-transparent pixels will be transformed into 0s.

4. Create another monochrome memory DC, the *inverse-AND* DC, and BitBlt from the AND DC to the inverse-AND DC using the raster-op code NOTSRCCOPY. This creates an inverted copy of the AND mask in the inverse-AND DC.

5. Convert the image in the XOR DC into an XOR mask by BitBlting the image in the inverse-AND DC to the XOR DC using the SRCAND raster-op code. You now have a completed XOR mask in the XOR DC and an AND mask in the AND DC.

6. Create yet another memory DC (the *destination* DC) and copy to it the portion of the

created with the Win32 ImageList_Create function. Once an image list is created, masked images are added to it with ImageList_AddMasked and drawn with ImageList_Draw. The following code snippet creates an image list, adds a bitmap to it with red designated as the transparency color, draws the masked image to hdc minus the red pixels, and cleans up by deleting the image list:

```
#include <commctrl.h>
.
.
.
int nIndex;
HIMAGELIST hImageList;
hImageList = ImageList_Create
  (cx, cy, TRUE, 1, 1);
nIndex = ImageList_AddMasked
  (hImageList, hBitmap, RGB (255,
  0, 0));
ImageList_Draw (hImageList,
  nIndex, hdc, x, y, ILD_TRANSPARENT);
ImageList_Destroy (hImageList);
```

Since image lists are part of the common controls library, you must include the header file COMMCTRL.H and link with COMCTL32.LIB. Also, you have to call InitCommonControls to load and initialize the common controls DLL before creating the image list. This is typically done during WM_CREATE processing.

Much of the overhead in drawing a masked image using the procedure shown above comes when ImageList_AddMasked is called and the AND and XOR masks are generated. If you will be drawing the image many times, create and initialize the image list when your application starts and destroy it when the application ends. In between, you can call ImageList_Draw as needed and keep the overhead to a minimum.

```
//*****
//
// MASKBMP.H
//
//*****

#ifndef __MASKBMP_H__
#define __MASKBMP_H__

#include <afxwin.h>

class CMaskedBitmap : public CBitmap
{
public:
    virtual void Draw (CDC*, int, int);
    virtual void DrawTransparent (CDC*, int, int, COLORREF);
};

#endif // __MASKBMP_H__
```



Figure 3: The C++ header file for a custom CBitmap-derived class named CMaskedBitmap, which supports two member functions that CBitmap doesn't: Draw and DrawTransparent.

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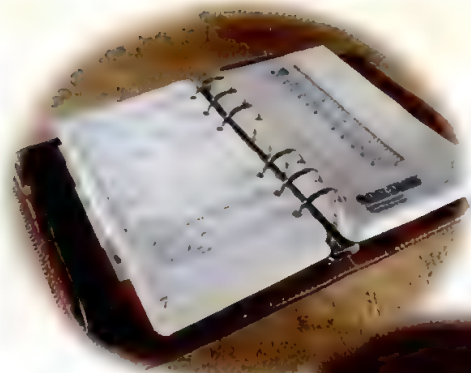
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```

//*****
//
// MASKBMP.CPP
//
//*****

#include "maskbmp.h"

void CMaskedBitmap::Draw (CDC* pDC, int x, int y)
{
    // Convert the bitmap's origin and dimensions to
    // logical units
    BITMAP bm;
    GetObject (sizeof (bm), &bm);
    CPoint size (bm.bmWidth, bm.bmHeight);
    pDC->DPtoLP (&size);

    CPoint org (0, 0);
    pDC->DPtoLP (&org);

    // Create a memory DC and select the bitmap into it
    CDC mdc;
    mdc.CreateCompatibleDC (pDC);
    CBitmap* pDefaultBitmap = mdc.SelectObject (this);
    mdc.SetMapMode (pDC->GetMapMode ());

    // BitBlt the image from the memory DC to the screen
    // DC
    pDC->BitBlt (x, y, size.x, size.y, &mdc, org.x,
    org.y, SRCCOPY);

    // Reselect the memory DC's default bitmap
    mdc.SelectObject (pDefaultBitmap);
}

void CMaskedBitmap::DrawTransparent (CDC* pDC, int x,
int y, COLORREF crColor)
{
    // Convert the bitmap's origin and dimensions to
    // logical units
    BITMAP bm;
    GetObject (sizeof (bm), &bm);
    CPoint size (bm.bmWidth, bm.bmHeight);
    pDC->DPtoLP (&size);

    CPoint org (0, 0);
    pDC->DPtoLP (&org);

    // Create a memory DC (mdcImage) and select the
    // bitmap into it
    CDC mdcImage;
    mdcImage.CreateCompatibleDC (pDC);
    CBitmap* pOldBitmapImage = mdcImage.SelectObject
    (this);
    mdcImage.SetMapMode (pDC->GetMapMode ());

    // Create another memory DC (mdcOr) and copy the
    // bitmap image to it
    CDC mdcOr;
    mdcOr.CreateCompatibleDC (pDC);
    mdcOr.SetMapMode (pDC->GetMapMode ());

```

```

CBitmap bitmapOr;
bitmapOr.CreateCompatibleBitmap (&mdcImage,
bm.bmWidth, bm.bmHeight);
CBitmap* pOldBitmapOr = mdcOr.SelectObject
(&bitmapOr);

mdcOr.BitBlt (org.x, org.y, size.x, size.y,
&mdcImage, org.x, org.y, SRCCOPY);

// Create an AND mask from the bitmap image
CDC mdcAnd;
mdcAnd.CreateCompatibleDC (pDC);
mdcAnd.SetMapMode (pDC->GetMapMode ());

CBitmap bitmapAnd;
bitmapAnd.CreateBitmap (bm.bmWidth, bm.bmHeight, 1,
1, NULL);
CBitmap* pOldBitmapAnd = mdcAnd.SelectObject
(&bitmapAnd);

COLORREF crOldBkColor = mdcImage.SetBkColor
(crColor);
mdcAnd.BitBlt (org.x, org.y, size.x, size.y,
&mdcImage, org.x, org.y, SRCCOPY);
mdcImage.SetBkColor (crOldBkColor);

// Create an inverse AND mask from the AND mask
CDC mdcInvAnd;
mdcInvAnd.CreateCompatibleDC (pDC);
mdcInvAnd.SetMapMode (pDC->GetMapMode ());

CBitmap bitmapInvAnd;
bitmapInvAnd.CreateBitmap (bm.bmWidth, bm.bmHeight,
1, 1, NULL);
CBitmap* pOldBitmapInvAnd = mdcInvAnd.SelectObject
(&bitmapInvAnd);

mdcInvAnd.BitBlt (org.x, org.y, size.x, size.y,
&mdcAnd, org.x, org.y, NOTSRCCOPY);

// Apply the inverse AND mask to the image in mdcOr
// to create an OR mask
mdcOr.BitBlt (org.x, org.y, size.x, size.y,
&mdcInvAnd, org.x, org.y, SRCAND);

// Copy the destination rectangle from the screen DC
// to a memory DC
CDC mdcDest;
mdcDest.CreateCompatibleDC (pDC);
mdcDest.SetMapMode (pDC->GetMapMode ());

CBitmap bitmapDest;
bitmapDest.CreateCompatibleBitmap (&mdcImage,
bm.bmWidth, bm.bmHeight);
CBitmap* pOldBitmapDest = mdcDest.SelectObject
(&bitmapDest);

mdcDest.BitBlt (org.x, org.y, size.x, size.y, pDC,
x, y, SRCCOPY);

// Apply the AND mask to the destination memory DC

```

(continues)

FIGURE 4: This is the C++ program source file for CMaskedBitmap.

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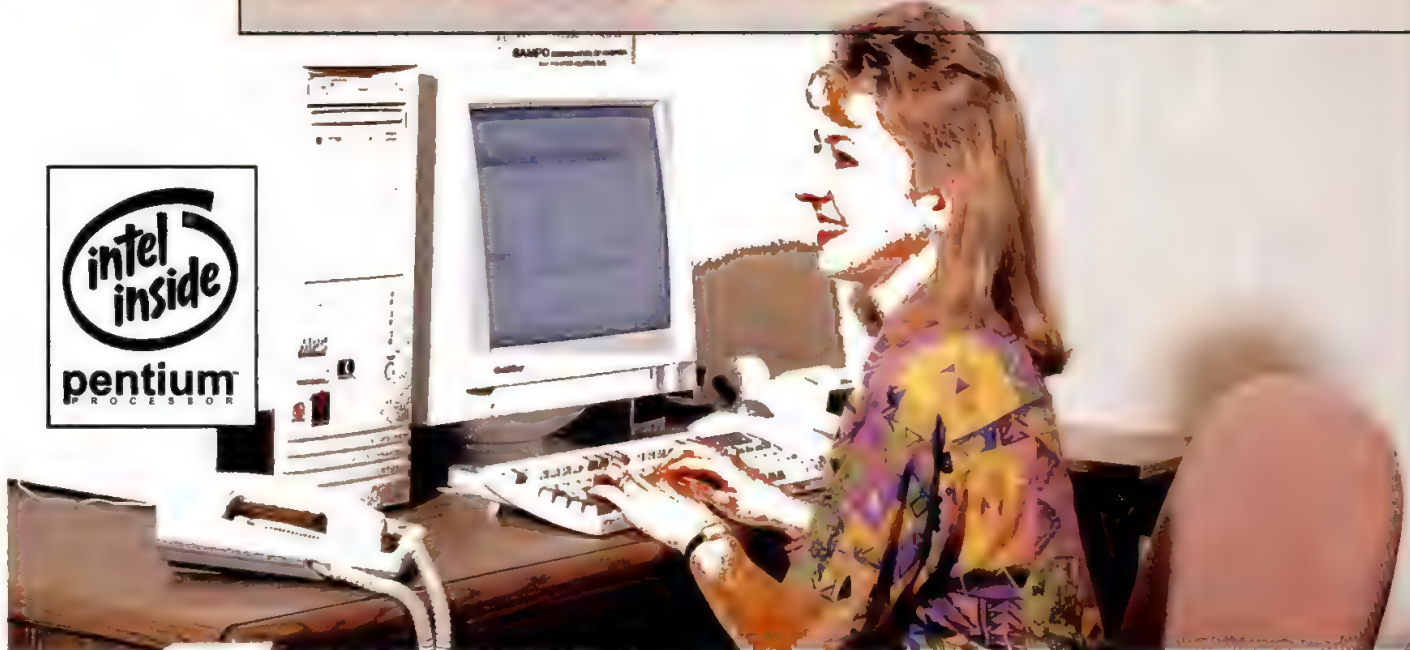
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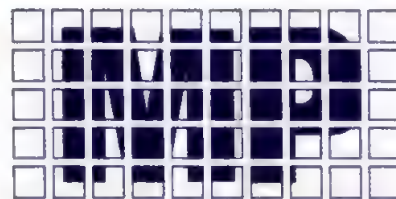
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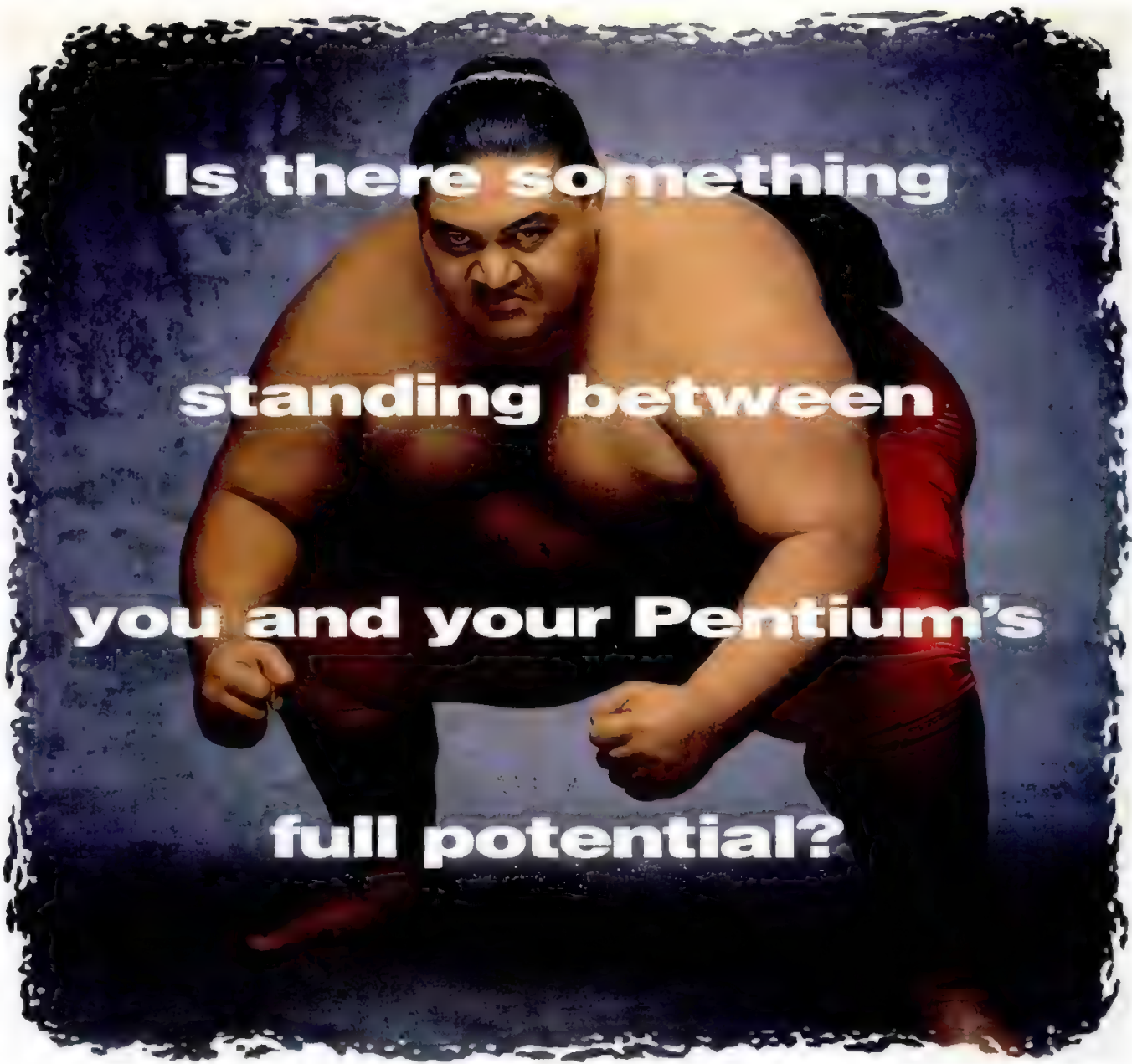
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```
mdcDest.BitBlt (org.x, org.y, size.x, size.y,
&mdcAnd, org.x, org.y, SRCAND);

// Apply the OR mask to the destination memory DC
mdcDest.BitBlt (org.x, org.y, size.x, size.y, &mdcOr,
org.x, org.y, SRCINVERT);

// Copy the resulting image to the screen
pDC->BitBlt (x, y, size.x, size.y, &mdcDest, org.x,
org.y, SRCCOPY);
```

```
// Restore default bitmaps
mdcDest.SelectObject (pOldBitmapDest);
mdcInvAnd.SelectObject (pOldBitmapInvAnd);
mdcAnd.SelectObject (pOldBitmapAnd);
mdcOr.SelectObject (pOldBitmapOr);
mdcImage.SelectObject (pOldBitmapImage);
}
```



FIGURE 4 (CONT.)

screen that will be modified by the drawing operation. Applying the AND and XOR masks to this memory DC and copying the resulting image to the screen DC rather than directly applying the masks to the screen DC reduces flicker.

7. Blit the image in the AND DC to the destination DC using SRCAND.

8. BitBlt the image in the XOR DC to the destination DC using SRCINVERT. SRCINVERT performs an XOR operation between the source and destination.

9. Blit the image in the destination DC to the screen DC using SRCCOPY.

10. Clean up by deleting the memory DCs

and any other GDI objects that were created in the course of the operation.

It sounds like a lot of work, and the plethora of DCs involved (not to mention the temporary bitmaps required to initialize the DCs) admittedly makes the discussion confusing, but in fact the above process can be boiled down to about 50 lines of code. Written properly, those lines of code will work with any bitmap, any transparency color, and any GDI mapping mode. I'll demonstrate how it's done in the next section by extending the MFC library with a CMaskedBitmap class that reduces the task of drawing transparent bitmaps to a single function call.

WORDS INTO ACTION

When MFC programmers deal with bitmaps, they typically use the CBitmap class, which is a thin wrapper around GDI bitmap objects and the associated API functions. One of the great things about working in C++ and using MFC is that built-in classes such as CBitmap are easily extended by deriving from them classes of your own and adding or replacing member functions.

The source code listings in Figures 3 and 4 implement a custom CBitmap-derived class named CMaskedBitmap that supports two member functions that CBitmap doesn't: Draw and DrawTransparent. Draw draws

```
*****
//
// MASKBMP.CPP
//
*****

#include "maskbmp.h"

void CMaskedBitmap::Draw (CDC* pDC, int x, int y)
{
    // Convert the bitmap's origin and dimensions to
    // logical units
    BITMAP bm;
    GetObject (sizeof (bm), &bm);
    CPoint size (bm.bmWidth, bm.bmHeight);
    pDC->DPtoLP (&size);

    CPoint org (0, 0);
    pDC->DPtoLP (&org);

    // Create a memory DC and select the bitmap into it
    CDC mdc;
    mdc.CreateCompatibleDC (pDC);
    CBitmap* pDefaultBitmap = mdc.SelectObject (this);
    mdc.SetMapMode (pDC->GetMapMode ());

    // BitBlt the image from the memory DC to the screen
    // DC
    pDC->BitBlt (x, y, size.x, size.y, &mdc, org.x,
    org.y, SRCCOPY);

    // Reselect the memory DC's default bitmap
```

```
mdc.SelectObject (pDefaultBitmap);
}

void CMaskedBitmap::DrawTransparent (CDC* pDC, int x,
int y, COLORREF crColor)
{
    // Convert the bitmap's origin and dimensions to
    // logical units
    BITMAP bm;
    GetObject (sizeof (bm), &bm);
    CPoint size (bm.bmWidth, bm.bmHeight);
    pDC->DPtoLP (&size);

    CPoint org (0, 0);
    pDC->DPtoLP (&org);

    // Create a memory DC (mdcImage) and select the
    // bitmap into it
    CDC mdcImage;
    mdcImage.CreateCompatibleDC (pDC);
    CBitmap* pOldBitmapImage = mdcImage.SelectObject
    (this);
    mdcImage.SetMapMode (pDC->GetMapMode ());

    // Create another memory DC (mdcOr) and copy the
    // bitmap image to it
    CDC mdcOr;
    mdcOr.CreateCompatibleDC (pDC);
    mdcOr.SetMapMode (pDC->GetMapMode ());

    CBitmap bitmapOr;
```

(continues)

FIGURE 5: This is the header file for MASKDEMO, which uses CMaskedBitmap to render a two-dimensional array of nonrectangular images on a complex background formed by performing a gradient fill in the window's client area.

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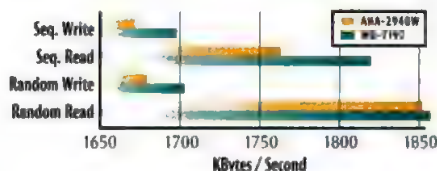
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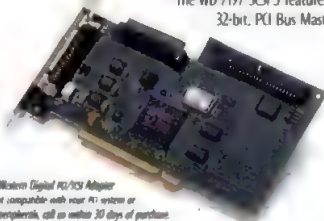
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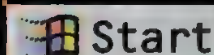
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90MHz
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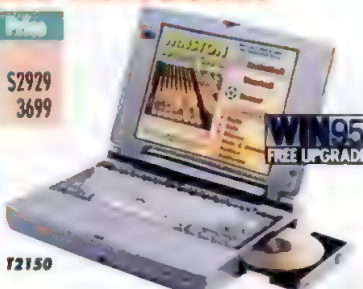


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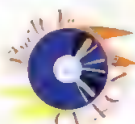


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CIRCLE 139 ON READER SERVICE CARD


```

bitmapOr.CreateCompatibleBitmap (&mdcImage,
bm.bmWidth, bm.bmHeight);
CBitmap* pOldBitmapOr = mdcOr.SelectObject
(&bitmapOr);

mdcOr.BitBlt (org.x, org.y, size.x, size.y,
&mdcImage, org.x, org.y, SRCCOPY);

// Create an AND mask from the bitmap image
CDC mdcAnd;
mdcAnd.CreateCompatibleDC (pDC);
mdcAnd.SetMapMode (pDC->GetMapMode ());

CBitmap bitmapAnd;
bitmapAnd.CreateBitmap (bm.bmWidth, bm.bmHeight,
1, 1, NULL);
CBitmap* pOldBitmapAnd = mdcAnd.SelectObject
(&bitmapAnd);

COLORREF crOldBkColor = mdcImage.SetBkColor
(crColor);
mdcAnd.BitBlt (org.x, org.y, size.x, size.y,
&mdcImage, org.x, org.y, SRCCOPY);
mdcImage.SetBkColor (crOldBkColor);

// Create an inverse AND mask from the AND mask
CDC mdcInvAnd;
mdcInvAnd.CreateCompatibleDC (pDC);
mdcInvAnd.SetMapMode (pDC->GetMapMode ());

CBitmap bitmapInvAnd;
bitmapInvAnd.CreateBitmap (bm.bmWidth, bm.bmHeight,
1, 1, NULL);
CBitmap* pOldBitmapInvAnd = mdcInvAnd.SelectObject
(&bitmapInvAnd);

mdcInvAnd.BitBlt (org.x, org.y, size.x, size.y,
&mdcAnd, org.x, org.y, NOTSRCCOPY);

```

```

// Apply the inverse AND mask to the image in mdcOr
// to create an OR mask
mdcOr.BitBlt (org.x, org.y, size.x, size.y,
&mdcInvAnd, org.x, org.y, SRCAND);

// Copy the destination rectangle from the screen DC
// to a memory DC
CDC mdcDest;
mdcDest.CreateCompatibleDC (pDC);
mdcDest.SetMapMode (pDC->GetMapMode ());

CBitmap bitmapDest;
bitmapDest.CreateCompatibleBitmap (&mdcImage,
bm.bmWidth, bm.bmHeight);
CBitmap* pOldBitmapDest = mdcDest.SelectObject
(&bitmapDest);

mdcDest.BitBlt (org.x, org.y, size.x, size.y, pDC,
x, y, SRCCOPY);

// Apply the AND mask to the destination memory DC
mdcDest.BitBlt (org.x, org.y, size.x, size.y,
&mdcAnd, org.x, org.y, SRCAND);

// Apply the OR mask to the destination memory DC
mdcDest.BitBlt (org.x, org.y, size.x, size.y, &mdcOr,
org.x, org.y, SRCINVERT);

// Copy the resulting image to the screen
pDC->BitBlt (x, y, size.x, size.y, &mdcDest, org.x,
org.y, SRCCOPY);

// Restore default bitmaps
mdcDest.SelectObject (pOldBitmapDest);
mdcInvAnd.SelectObject (pOldBitmapInvAnd);
mdcAnd.SelectObject (pOldBitmapAnd);
mdcOr.SelectObject (pOldBitmapOr);
mdcImage.SelectObject (pOldBitmapImage);

```

FIGURE 5 (CONT.)

the bitmap object on a display surface represented by a CDC object (a simple and very practical feature that is nonetheless absent from MFC's CBitmap class). DrawTransparent also draws the bitmap, but it accepts an additional argument specifying an RGB transparency color. Pixels in the bitmap whose color equals the transparency color are not drawn on the display surface and therefore may be considered transparent. If *bitmap* represents a bitmap object and *dc* corresponds to a screen device-context object, the statement

```
bitmap.Draw (&dc, x, y);
```

renders the bitmap on the screen at the coordinates (x,y), while the statement

```
bitmap.DrawTransparent (&dc, 0,
-0, RGB (0, 0, 255));
```

draws all but the bitmap's bright blue pixels (red=0, green=0, blue=255).

DrawTransparent precisely follows the procedure described in the previous section. The source code is commented, so you shouldn't have any trouble following the logic. As you peruse the source, note how temporary bitmap objects created from

**I encountered a "gotcha"
that serves to remind us
that MFC wrapper
functions are not always
what they seem.**

MFC's CBitmap class are used to initialize the various memory DCs prior to BitBlt'ing. A freshly created memory DC is just one pixel wide and one pixel high and has a color depth of 1. Setting the DC to the desired dimensions and color format is achieved by selecting in a bitmap. CBitmap::CreateCompatibleBitmap is used to create bitmaps for the color DCs, and CBitmap::CreateBitmap is called with the number-of-planes and bits-per-pixel values set to 1 to create monochrome bitmaps for the AND and inverse-AND DCs. In all cases, the dimensions of the bitmaps are the same as those of the bitmap that's being drawn. If you're rusty on memory DCs and this code looks a little strange to you, take a moment to study chapter 13 ("Bits, Blts, and Metafiles") of Charles Petzold's *Programming Windows* (1992, Microsoft Press). That should clear some of the cobwebs.



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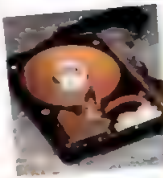
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A MAPPING-MODE MUDDLE

While developing CMaskedBitmap, I encountered a "gotcha" that serves as a friendly reminder that MFC wrapper functions are not always what they seem and that MFC sometimes introduces complexities of its own to the development process. This particular gotcha relates to the CDC::DPTOLP function, which is closely related to the DPTOLP API function. In CMaskedBitmap::Draw and CMaskedBitmap::DrawTransparent, the statements

```

BITMAP bm;
GetObject (sizeof (bm), &bm);
CPoint size (bm.bmWidth,
             -bm.bmHeight);
DC->DPTOLP (&size);

```

obtain the bitmap's dimensions (in device

MFC functions with the same names as API functions don't always work the same way.

units, or pixels) and convert them to logical units. This is necessary so that the bitmap won't be distorted if the mapping mode is other than MM_TEXT. In my first attempt at CMaskedBitmap, I used a CSize object, not a CPoint object, to store the bitmap's dimensions. It made sense, or so I thought; after all, a bitmap's width and height are *sizes*, not

points in space. Yet when I used CSize, bitmaps did not draw properly in any mapping mode except MM_TEXT. After a couple of frustrating hours with a debugger and a look at MFC's source code, I learned why.

When you pass the address of a CPoint object to CDC::DPTOLP, the call goes straight through to the API function of the same name and the conversion is performed properly, even if one or more of the values comes back negative. But when you pass CDC::DPTOLP the address of a CSize object, MFC performs the conversion itself and uses the abs function to wipe out any negatives. It might make sense that a "size" shouldn't be negative, yet that's exactly what BitBlt expects—negative height values—in mapping modes where the positive y axis points upward. Lesson learned. I assumed that CDC::DPTOLP worked exactly like

```

//*****
//
//  MASKDEMO.CPP
//
//*****

#include <afxwin.h>
#include "maskbmp.h"
#include "maskdemo.h"

CMyApp myApp;

//*****
// CMyApp member functions
//*****

BOOL CMyApp::InitInstance ()
{
    m_pMainWnd = new CMainWindow ();
    m_pMainWnd->ShowWindow (m_nCmdShow);
    m_pMainWnd->UpdateWindow ();
    return TRUE;
}

//*****
// CMainWindow message map and member functions
//*****

BEGIN_MESSAGE_MAP (CMainWindow, CFrameWnd)
    ON_WM_CREATE ()
    ON_WM_PAINT ()
END_MESSAGE_MAP ()

CMainWindow::CMainWindow ()
{
    Create (NULL, "Masked Bitmap Demo");
}

int CMainWindow::OnCreate (LPCREATESTRUCT lpCreateStruct)
{
    m_bitmap.LoadBitmap ("DriveImage");
    return 0;
}

```

```

void CMainWindow::OnPaint ()
{
    CPaintDC dc (this);

    CRect rect;
    GetClientRect (&rect);

    CBrush* pBrush[256];
    for (int i=0; i<256; i++)
        pBrush[i] = new CBrush (RGB (0, 0, 255 - i));

    int nIndex;
    int nWidth = rect.Width ();
    int nHeight = rect.Height ();
    CRect rectLine;

    for (i=0; i<nHeight; i++) {
        nIndex = (i * 255) / nHeight;
        rectLine.SetRect (0, i, nWidth, i + 2);
        dc.FillRect (&rectLine, pBrush[nIndex]);
    }

    for (i=0; i<256; i++)
        delete pBrush[i];

    BITMAP bm;
    m_bitmap.GetObject (sizeof (BITMAP), &bm);
    int cx = (rect.Width () / (bm.bmWidth + 8)) + 1;
    int cy = (rect.Height () / (bm.bmHeight + 8)) + 1;

    int x, y, j;
    for (i=0; i<cx; i++) {
        for (j=0; j<cy; j++) {
            x = 8 + (i * (bm.bmWidth + 8));
            y = 8 + (j * (bm.bmHeight + 8));
            m_bitmap.DrawTransparent (&dc, x, y, RGB
                                     (255, 0, 0));
        }
    }
}

```

FIGURE 8: This is the program source file for MASKDEMO.



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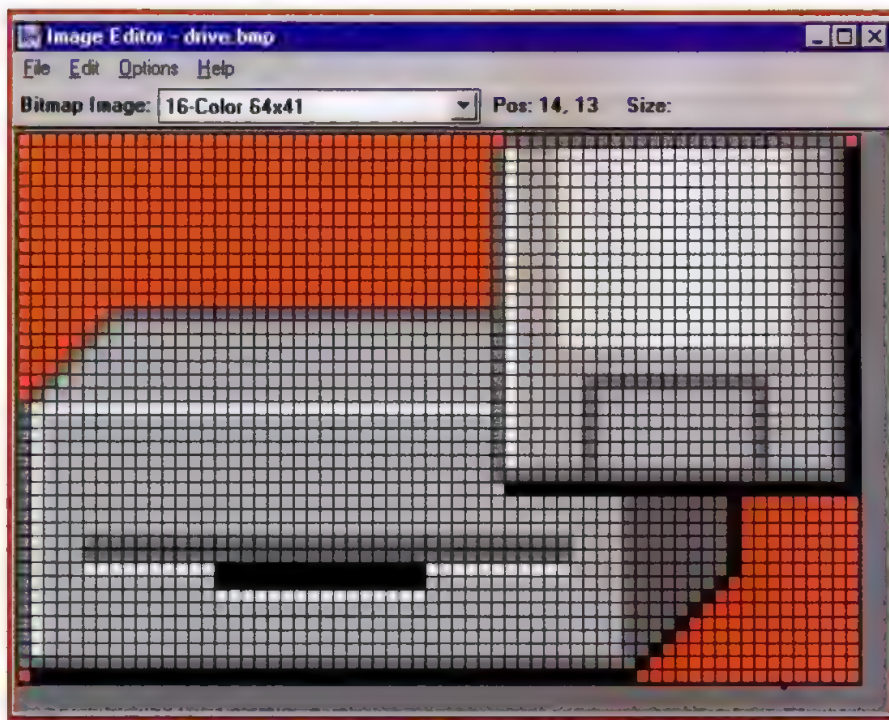


FIGURE 7: Red pixels (seen in the SDK's Image Editor) are masked out when the image is drawn on the screen and `CMaskedBitmap::DrawTransparent` is passed the RGB value for red.

`DPTOLP`, because MFC functions with the same names as API functions usually do work just like their API counterparts. In this case, that was a bad assumption. Once I realized what was happening, I changed `CSize` to `CPoint` and the problem went away.

`CMaskedBitmap::DrawTransparent` provides a convenient, one-step solution to the problem of performing transparent BitBlt's; it works on all Windows installations and requires no special bitmaps. You can use the `CMaskedBitmap` class in your own applications by including `MASKBMPH` and `MASKBMPCPP` in your project. You'll find these and all other files mentioned here on PC MagNet in the file `BLTMASK.ZIP`.

The sample program `MASKDEMO`, whose source code appears in Figures 5 and 6, uses `CMaskedBitmap` to render a two-dimensional array of nonrectangular images on a complex background formed by performing a gradient fill in the window's client area. The bitmap itself is shown in Figure 7; red in the bitmap image represents pixels that will be transparent when the image is drawn on the screen. Figure 8 shows the result of running `MASKDEMO.EXE`. The version of `MASKDEMO.EXE` posted on PC MagNet is a 32-bit application, so you must run it under Windows 95 or Windows NT 3.51. If you wish to use `CMaskedBitmap` in a Windows 3.1 application, you'll have to recompile it for 16 bits. You can compile `MASKDEMO.CPP` and `MASKBMPCPP` with Visual C++ or any C++ compiler that supports MFC.

ent fill on the background using 1-pixel-wide brush strokes instead of pens, so colors will be dithered on 16- and 256-color displays. Then it splashes images onto the screen by placing repeated calls to `CMaskedBitmap::DrawTransparent`. The RGB value passed to `DrawTransparent` is RGB (255, 0, 0), so pixels of that color in the bitmap are invisible at the destination. The result is a rather striking image that, because of the non-uniform background color, would be difficult to achieve using any other method.

MORE TO COME

There are plenty of practical uses for a `CMaskedBitmap` class. One is creating animations involving nonrectangular sprite-like images. Another is drawing file, folder, and drive icons in a File Manager-type application. If you use `CMaskedBitmap` for animations, you'll probably want to modify it so that the AND and XOR masks are generated just once rather than each time the image is drawn. This could improve the speed of the animation by a factor of two or more. And in animation, speed is everything.

I originally developed `CMaskedBitmap` to draw images with transparent backgrounds in a custom MFC list box class named `CBitmapListBox` that does for owner-drawn list boxes what `CBitmapButton` does for owner-drawn buttons. `CBitmapListBox` is an interesting class in and of itself. In a future Power Programming column, you'll see just how easy owner-drawn list boxes can be when you do them the MFC way. □

Jeff Prosise is a contributing editor of PC Magazine. His new book, Programming Windows 95 with MFC, is scheduled to be published later this year by Microsoft Press.



FIGURE 8: Presto! No red pixels.

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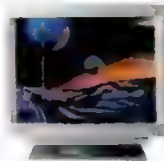
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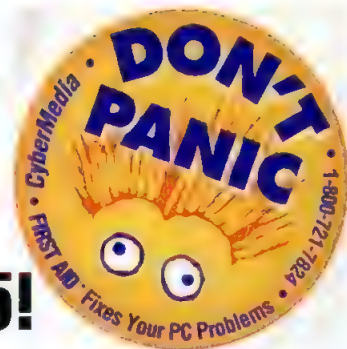
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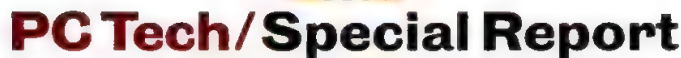


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The Complete Windows 95 Annotated File Listing

The screenshot shows a Windows Explorer window titled "Exploring - Windows". The left pane displays a tree view of the file system, with "Start Menu" selected under the "Windows" folder. The right pane shows a list of files and folders, including "Command", "Config", "Cursors", "Desktop", "Fonts", "Help", "Init", "Media", "Pti", "Recent", "SendTo", "ShellNew", "Spool", "Start Menu", "System", "Temp", "Accessor.gsp", "Accstat.exe", "Ampopel", "Asp2Zip.sys", "Black Thatch.bmp", "Blue Rivets.bmp", "Bubbles.bmp", "Calc.exe", "Carved Stone.bmp", "Cdpayer.exe", "Circles.bmp", "Cmd640a.sys", "Cmd640a2.sys", "Command.com", "Control", "Control.exe", "Control.ins", "Dblbuff.sys", "Defrag.exe", "Desktop.grp", "Dialer.exe", "Display.bit", "Document.grp", "Dosprompt", "Enm396.exe", "excel5.ins", "excel5.xls", "Exchange.bit", "Exchng32...", "Exchng32...", "Exit To Dos", "Explorer.exe", "Explorer.exe", "Expost.exe", "Extra.bit", "Faq.bit", "Fontview.exe", "General.bit", "Graph5.ins", "Gripconv.exe", "Hardware.bit", "Hmem.sys", "Houndstooth.bmp", "Hppcl100", "Hppclp00", "Htshp.sys", "Internet.bit", "Ios.ins", "Logos.sys", "Logow.sys", "Main.grp", "Moncons.dll", "Mouse.bit", "Mplayer.exe", "Msdosdrv.in", "Mshlmap.in", "Msn.bit", "Mtriffice...", "Msoffice.in", "Mstbconv.in", "Multimed.grp", "Nddexp.dll", "Nddenh.dll", "Nddshp.sys", "Ndslog.bit", "Net.exe", "Net.msg", "Netdde.exe", "Netdet.in", "Netm.msg", "Network.bt", "Netpad.exe", "Packager.exe", "Porush.exe", "Portnd.dll", "Printps.bmp", "Powerpnt...", "powerpnt.in", "Printers.bit", "Program.exe", "Program.in", "Programs.grp", "Programs.bt", "Protman.dos", "Protman.exe", "Protocol...", "protocol.in", "Qhw...", "Qhw.in", "Ramdrive.sys", "Readme.bt", "Regedit.exe", "Rundll.exe", "Rundll32.exe", "Scandisk.exe", "Setup.bmp", "Setup.old", "Setup.exe", "Shellconf.Cache", "Smartdrv.exe", "standard.vpe", "Straw Mat.bmp", "Support.bit", "System...", "Systembak", "System.cbk", "System.dad", "System.dat", "System.in".

OCTOBER 10, 1995 PC MAGAZINE 423

Windows 95 Annotated File Listing

Filename	Description	Filename	Description
256COLOR.BMP	Wallpaper bitmap	ARP.EXE	TCP/IP Address Resolution Protocol command
31USERS.HLP	Windows help	ARROW.MPD	SCSI driver
3DBLOCKS.BMP	Wallpaper bitmap	ARROW_1.CUR	Cursor
800950.DAT	Microsoft Network component	ARROW_2.CUR	Cursor
850.DAT	Support for Codepage 850 character set	ARROW_3.CUR	Cursor
8514FIX.FON	Font file	ARROW_4.CUR	Cursor
8514OEM.FON	Font file	ARROW_5.CUR	Cursor
8514SYS.FON	Font file	ARROW_L.CUR	Cursor
95WRK.CNT	Contents for Resource Kit help	ARROW_M.CUR	Cursor
95WRK.HLP	Resource Kit help	ASPI2HLP.SYS	Helper driver
A_PNT518.SPD	Printer driver	AST__470.SPD	Printer driver
ACCESS.CPL	Accessibility Control Panel icon	ATI.VXD	ATI minidriver
ACCESS.HLP	Accessibility Control Panel help	ATIM32.DRV	Display driver for the ATI Ultra Pro (mach32)
ACCSTAT.EXE	Accessibility-status indicator	ATIM64.DRV	Display driver for the ATI Ultra Pro Turbo (mach64)
ADAPTER.INF	System-detection setup information	ATIM8.DRV	Display driver for the ATI Ultra (mach8)
ADDREG.EXE	International Settings program	ATTRIB.EXE	MS-DOS Attributes command line utility
ADMIN.ADM	Administrator template for System Policy editor	AUDIOCDC.HLP	Help file for audio codec support
ADVAPI32.DLL	Advanced Win32 application programming interfaces	AWADPR32.EXE	Add Printer utility
AHA154X.MPD	SCSI driver	AWBMSC32.DLL	Bit Scaler codec
AHA174X.MPD	SCSI driver	AWBTRV32.DLL	Bit Reversal codec
AIC78XX.MPD	SCSI driver	AWCAPI32.DLL	Capability database
ALWAYS.MPD	SCSI driver	AWCL1_32.DLL	Class 1 modem driver
AM1500T.VXD	Network adapter driver	AWCL2_32.DLL	Class 2 modem driver
AM2100.DOS	Network adapter driver	AWCDDC32.DLL	Fax codec
AMIPRO.SAM	Ami Pro document template	AWDCXC32.DLL	DCX codec
AMSINT.MPD	SCSI driver	AWDEVL16.DLL	16-bit printer back end
ANSI.SYS	MS-DOS ANSI driver	AWDEVL32.DLL	32-bit printer back end
APIX.VXD	APIX virtual device	AWFAX.CNT	Contents for At Work help
APLW8101.SPD	Printer driver	AWFAX.HLP	At Work help
APLWIIF1.SPD	Printer driver	AWFAX.INF	At Work setup
APLWIIG1.SPD	Printer driver	AWFAXP32.DLL	Mail API fax transport
APLWNTRI.SPD	Printer driver	AWFEXT32.DLL	Exchange extensions
APLWSEL.SPD	Printer driver	AWFMON32.DLL	Print monitor
APM.INF	Advanced power management setup information	AWFR32.DLL	Format resolution
APP850.FON	Font file	AWFXAB32.DLL	Address book
APPEND.EXE	MS-DOS Append utility	AWFXCG32.DLL	Property sheets for Mail API
APPLE230.SPD	Printer driver	AWFXEX32.EXE	LocalFax dedicated fax process
APPLE380.SPD	Printer driver	AWFXIO32.DLL	Fax common IO
APPLETPP.INF	Setup information	AWFXRN32.DLL	EFAX file-based transport interface
APPLETS.INF	Setup information	AWKRNL32.DLL	Common support file
APPS.HLP	Applications compatibility information	AWLFT32.DLL	IFAX file-based local fax interface
APPS.INF	PIF configuration for MS-DOS-based applications	AWLHUT32.DLL	Microsoft Fax Linearizer Header utilities
APPSTART.ANI	Animated cursor	AWLINZ32.DLL	Microsoft fax linearizer
APPWIZ.CPL	Application install Control Panel	AWLZRD32.DLL	LZ encoder/decoder
APTOLLD1.SPD	Printer driver	AWNFA32.DLL	Network fax client
APTOLLW1.SPD	Printer driver	AWPRT.HLP	At Work print driver help
ARCADE.BMP	Wallpaper bitmap	AWPWD32.DLL	Security support
ARCSRV32.EXE	Cheyenne ArcServe backup agent	AWRAMB32.DLL	Reuters Business Alert decoder
ARGYLE.BMP	Wallpaper bitmap	AWRBAE32.DLL	Reuters Business Alert encoder
ARIAL.TTF	Arial font	AWRESX32.DLL	Resource Executor
ARIALBD.TTF	Arial Bold font	AWRNDR32.DLL	Render server
ARIALBI.TTF	Arial Bold Italic font	AWSCHD32.DLL	Fax scheduler
ARIALI.TTF	Arial Italic font	AWSNT032.EXE	Mail Print To extensions



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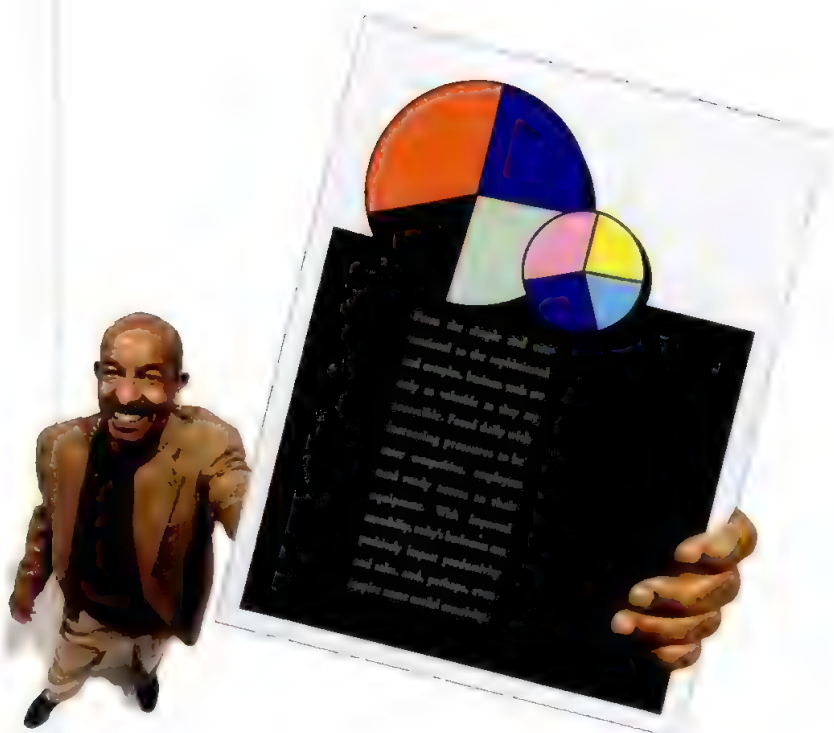


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CIRCLE 208 ON READER SERVICE CARD

Windows 95 Annotated File Listing

Filename	Description	Filename	Description
AWSRVR32.DLL	Network fax server	CANYON.MID	Sample MIDI file
AWT30_32.DLL	T30 fax protocol driver	CARDDRV.EXE	PCMCIA support
AWUPD.INF	At Work printer update information	CARDS.DLL	Hearts game
AWUTIL32.DLL	At Work Security support	CARS.BMP	Wallpaper bitmap
AWVIEW32.DLL	Microsoft Fax Viewer support	CASTLE.BMP	Wallpaper bitmap
AZT16.VXD	Aztech audio driver	CCAPI.DLL	Microsoft Network component
AZT16C.DRV	Aztech audio driver	CCDIALER.EXE	Microsoft Network component
AZT16W.DRV	Aztech audio driver	CCEI.DLL	Microsoft Network component
BACKUP.CFG	Backup applet configuration file	CCPSH.DLL	Microsoft Network component
BACKUP.CNT	Contents for Backup help	CCTN220.DLL	CompuServe Mail API provider
BACKUP.EXE	Backup applet	CDFS.VXD	CD-ROM file system
BACKUP.HLP	Backup help	CDPLAYER.CNT	Contents for CD Player context-sensitive help
BAMBOO.BMP	Wallpaper bitmap	CDPLAYER.EXE	CD Player application
BANANA.ANI	Animated cursor	CDPLAYER.HLP	CD Player help
BATCH.EXE	Batch editor	CDTSD.VXD	CDTSD virtual device
BATCH.HLP	Batch editor	CDVSD.VXD	CDVSD virtual device
BBSNAV.NAV	Microsoft Network component	CE2NDIS3.VXD	Xircom NDIS 3 driver
BEAM_1.CUR	Cursor	CEMMF.INF	Xircom network-card information
BEAM_2.CUR	Cursor	CENDIS.VXD	Xircom Creditcard Ethernet adapter NDIS driver
BEAM_3.CUR	Cursor	CHARMAP.EXE	Charmap applet
BEAM_4.CUR	Cursor	CHEYENNE.INF	Cheyenne ArcServe information
BEAM_5.CUR	Cursor	CHEYPROP.DLL	Cheyenne ArcServe support DLL
BEAM_L.CUR	Cursor	CHIADI.DLL	Backup applet
BEAM_M.CUR	Cursor	CHIKDI.DLL	Backup applet
BEZIER.SCR	Screen saver	CHIMES.WAV	Sample audio file
BHNETB.DLL	Network monitor SMS client	CHIPS.DRV	Chips & Technologies display driver
BHSUPP.DLL	Network monitor SMS client	CHIPS.VXD	Chips & Technologies minidriver
BIGMEM.DRV	BIGMEM virtual device	CHKDSK.EXE	MS-DOS Check Disk utility
BIOS.VXD	Plug and Play BIOS interface	CHKSTATE.SYS	MS-DOS Check State driver
BIOSXLAT.VXD	BIOSXLAT virtual device	CHOOSUSR.DLL	Net client
BJC600.ICM	Printer profile	CHORD.WAV	Sample audio file
BJC800.ICM	Printer profile	CIRCLES.BMP	Wallpaper bitmap
BKUPAGNT.EXE	Arcada agent	CIRRUS.DRV	Cirrus Logic display driver
BKUPAGNT.INF	Arcada agent	CIRRUS.VXD	Cirrus Logic minidriver
BKUPNET.DLL	Arcada agent	CIRRUSMM.DRV	Cirrus Logic display driver
BKUPPROP.DLL	Arcada agent	CIT24US.DRV	Printer driver
BRHJ770.DRV	Printer driver	CIT9US.DRV	Printer driver
BROTHER9.DRV	Printer driver	CITOH.DRV	Printer driver
BROTHR24.DRV	Printer driver	CLIPBOOK.CNT	Contents for Clipbook help
BUBBLES.BMP	Wallpaper bitmap	CLIPBOOK.EXE	Clipbook viewer
BUSLOGIC.MPD	SCSI driver	CLIPBOOK.HLP	Clipbook viewer help
BUSY_1.CUR	Cursor	CLIPBRD.EXE	Clipboard
BUSY_2.CUR	Cursor	CLIPBRD.EXE	Clipboard viewer
BUSY_3.CUR	Cursor	CLIPBRD.HLP	Clipboard viewer help
BUSY_4.CUR	Cursor	CLIPSRV.EXE	Clipboard viewer
BUSY_5.CUR	Cursor	CLOUDS.BMP	Wallpaper bitmap
BUSY_L.CUR	Cursor	CM2NDIS3.VXD	Xircom Creditcard Ethernet adapter NDIS 3 driver
BUSY_M.CUR	Cursor	CMC.DLL	Common messaging calls for Mail API 1.0
CALC.CNT	Contents for Calculator help	CMDIALOG.VBX	Batch editor
CALC.EXE	Calculator	COIN.ANI	Animated cursor
CALC.HLP	Calculator help	COMBUFF.VXD	COM-port virtual device
CANON330.DRV	Printer driver	COMCTL31.DLL	Win 3.1 Version of Custom Controls Library
CANON800.DRV	Printer driver	COMCTL32.DLL	32-bit Shell component
CANONLBP.DRV	Printer driver	COMDLG32.DLL	32-bit Common Dialog Library



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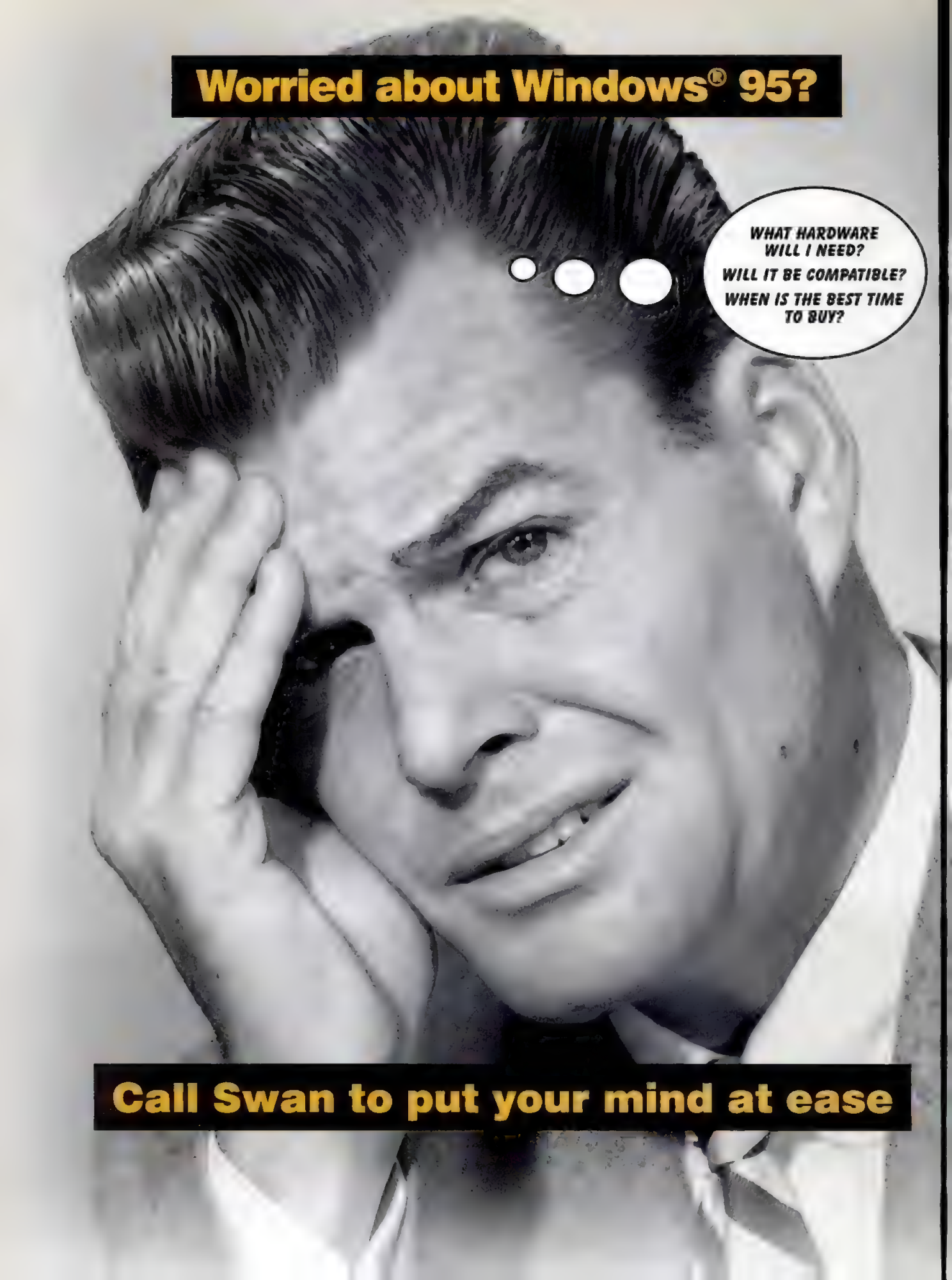
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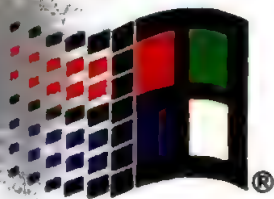


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Windows 95 Annotated File Listing

Filename	Description	Filename	Description
COMM.DRV	Common API driver for Mini Win 3.1 setup	D20_MS.SPD	Printer driver
COMMAND.COM	Common-dialogs libraries	D2150_MS.SPD	Printer driver
COMMCTRL.DLL	16-bit Custom Controls Library	D2250_MS.SPD	Printer driver
COMMDLG.DLL	16-bit Common Dialog Library	D32_MS.SPD	Printer driver
COMMON.HLP	OLE help	D40_MS.SPD	Printer driver
COMPAQ.DRV	Compaq QVision display driver	D5100_MS.SPD	Printer driver
COMPAQ.VXD	Compaq minidriver	DATAEDCL.DLL	Microsoft Network component
COMPOBJ.DLL	OLE 16/32 Interoperability Library	DATAP462.SPD	Printer driver
CONAGENT.EXE	32-bit console support	DBKVSSD.VXD	Databook PCMCIA support
CONFAPI.DLL	Microsoft Network component	DBLBUFF.SYS	Double-buffering driver
CONFIDENT.CPE	Fax cover page that reads "Confidential!"	DBLSPACE.BAT	Replacement stub for MS-DOS 6.x Doublespace
CONFIGMG.VXD	Configuration Manager virtual device	DC1152_1.SPD	Printer driver
CONTROLEXE	Control Panel folder	DC1152F1.SPD	Printer driver
CONTROL.INF	International Control Panel	DC2150P1.SPD	Printer driver
COUNTRY.SYS	MS-DOS country language driver	DC21X4.DOS	Network adapter driver
COUR.TTF	Courier font	DC21X4.SYS	NDIS 3 driver
COURBD.TTF	Courier Bold font	DC2250P1.SPD	Printer driver
COURBI.TTF	Courier Bold Italic font	DC5100_1.SPD	Printer driver
COURE.FON	Font file	DCAMAC.BIN	DCA Immatrac network-card driver
COURF.FON	Font file	DCCOLOR1.SPD	Printer driver
COURI.TTF	Courier Italic	DCD11501.SPD	Printer driver
CP_1252.NLS	Codepage information	DCIMAN.DLL	Display control interface
CP_437.NLS	Codepage information	DCIMAN32.DLL	Display control interface
CP_850.NLS	Codepage information	DCLF02_1.SPD	Printer driver
CP_852.NLS	Codepage information	DCLF02F1.SPD	Printer driver
CP_857.NLS	Codepage information	DCLN03R1.SPD	Printer driver
CP_866.NLS	Codepage information	DCLPS171.SPD	Printer driver
CP_869.NLS	Codepage information	DCLPS321.SPD	Printer driver
CP_PS241.SPD	Printer driver	DCLPS401.SPD	Printer driver
CPPER241.SPD	Printer driver	DCPS1721.SPD	Printer driver
CPPMQ151.SPD	Printer driver	DCPS1761.SPD	Printer driver
CPPMQ201.SPD	Printer driver	DCTPS201.SPD	Printer driver
CPPRO518.SPD	Printer driver	DDEMLDLL	DDE Messaging libraries
CPPSNB10.SPD	Printer driver	DEBMP.DLL	Raster Display engine
CPPSX241.SPD	Printer driver	DEBUG.EXE	MS-DOS Debug utility
CPQAE05.EXE	Compaq BIOS support	DEC24PIN.DRV	Printer driver
CPQAE06.EXE	Compaq BIOS support	DEC3200.DRV	Printer driver
CPQMODE.INI	Compaq driver support	DEC3250.SPD	Printer driver
CPQMON.INI	Compaq driver support	DECCORE.VXD	DEC Pathworks 5.0 support
CPQNDIS.DOS	Network adapter driver	DECLAN.VXD	DEC LAN network card driver
CPQNDIS3.VXD	Compaq Ethernet controller NDIS driver	DECLICL.VXD	DEC Pathworks 5.0 support
CPQTOK.DOS	Network adapter driver	DECPSMW4.DLL	DEC Port Monitor support
CROSS_1.CUR	Cursor	DECPSMW4.HLP	DEC Port Monitor help
CROSS_2.CUR	Cursor	DEFRAG.BAT	Replacement stub for MS-DOS 6.x Disk Defragger
CROSS_3.CUR	Cursor	DEFRAG.EXE	Disk defragger
CROSS_4.CUR	Cursor	DEHEX.DLL	Hex display engine
CROSS_5.CUR	Cursor	DELTEMP.COM	Setup Helper utility
CROSS_L.CUR	Cursor	DELTREE.EXE	MS-DOS Deltree utility
CROSS_M.CUR	Cursor	DEMET.DLL	Vector display engine
CRDLL.DLL	Microsoft C Runtime Library	DEPCA.DOS	Network adapter driver
CTNDW.VXD	XIRCOM Token-Ring 16/4 Credit Card Adapter driver	DESK.CPL	Desktop Control Panel
D17_MS.SPD	Printer driver	DESKCP16.DLL	16-bit desktop Control Panel
D1712_MS.SPD	Printer driver	DESKJETC.DRV	Printer driver
D176_MS.SPD	Printer driver	DESKTOP.INI	Fonts Folder component

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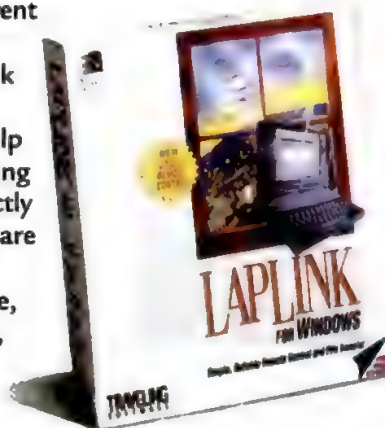
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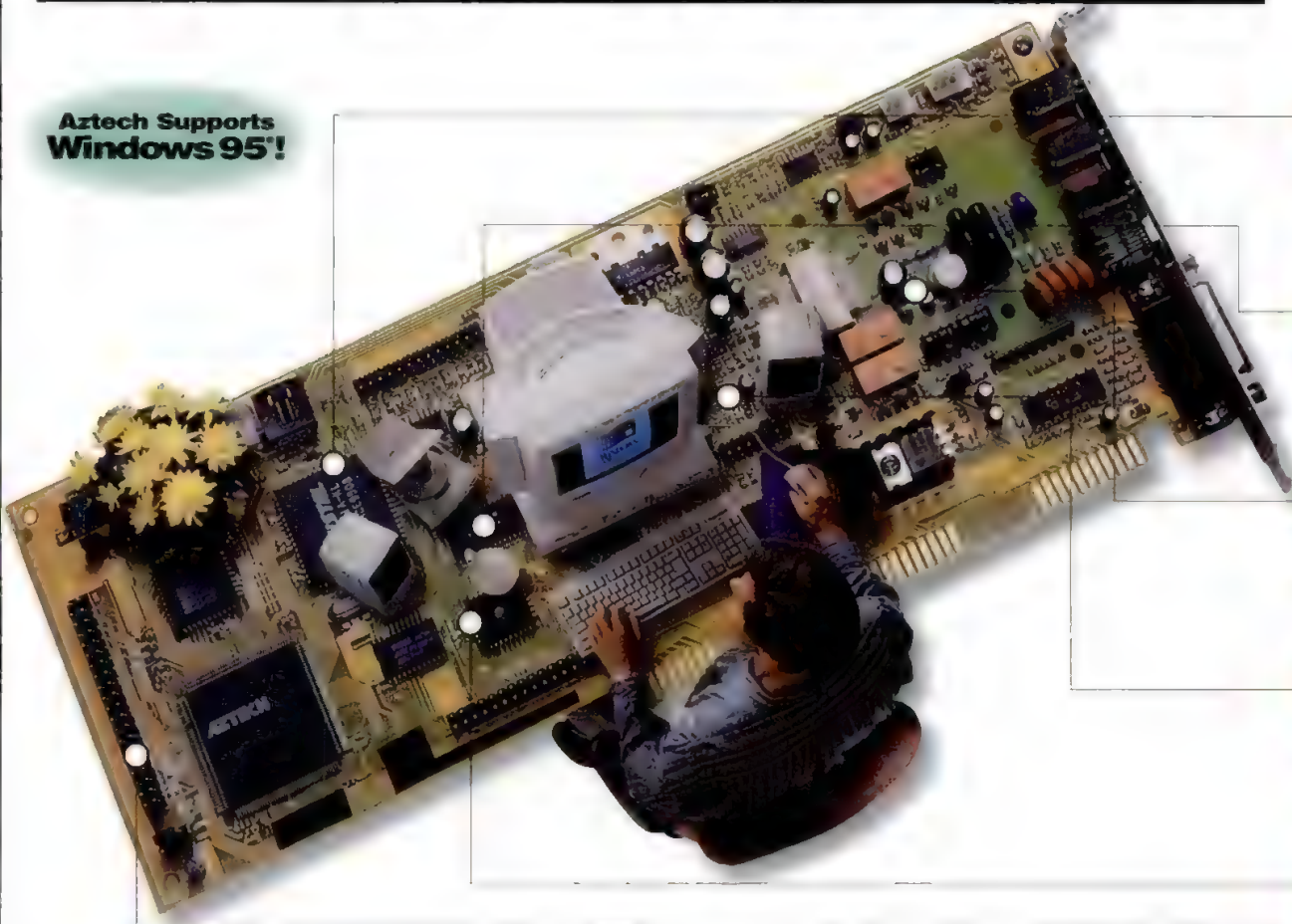
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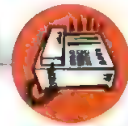
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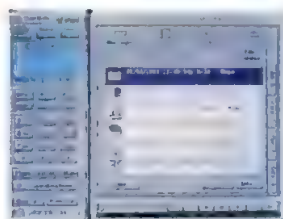
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Windows 95

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*Source: PC Magazine, May 16, 1995

**WinBench 95, version 1.0, Disk WinMark result on representative PC platforms.

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CIRCLE 077 ON READER SERVICE CARD

Windows 95 Annotated File Listing

Filename	Description	Filename	Description
DESKTOPMSN	Microsoft Network component	E22ND.DOS	Network adapter driver
DESS.DLL	Spreadsheet display engine	E30N3.VXD	NDIS 3 driver
DEWP.DLL	Word Processing display engine	E30ND.DOS	Network adapter driver
DIALER.CNT	Contents for dialer help	E31N3.VXD	NDIS 3 driver
DIALER.EXE	Phone dialer	E31ND.DOS	Network adapter driver
DIALER.HLP	Phone dialer help	EAGLECAF.BIN	Network adapter driver
DIBENG.DLL	Device-independent bitmap engine	EAGLEMAC.BIN	Network adapter driver
OICONIX.DRV	Printer driver	EBIOS.VXD	EBIOS virtual device
DING.WAV	Sample audio file	EDIT.COM	MS-DOS editor
DINOSAUR.ANI	Animated cursor	EDIT.HLP	MS-DOS editor help
DIRECTCC.EXE	Direct cable-connection application	EDLIN.EXE	MS-DOS line-oriented editor
DISKCOMP.COM	MS-DOS Disk Compare utility	EE16.SYS	Network adapter driver
DISKCOPY.COM	MS-DOS DiskCopy utility	EGA.CPI	DOS fonts for character mapping
DISKCOPY.DLL	DiskCopy context menu extension	EGA2.CPI	DOS fonts for character mapping
DISKDRV.INF	Class installer setup information	EGA3.CPI	DOS fonts for character mapping
DISKTS.D.VXD	DiskTSD virtual device	EGYPT.BMP	Wallpaper bitmap
DISKVSD.VXD	DiskVSD virtual device	EISA.VXD	Plug and Play EISA-bus enumerator
DISPOIB.DLL	Video for Windows device-independent bitmap support	EK550C.ICM	Printer profile
DISPLAY.SYS	MS-DOS international display driver	EL59X.DOS	Network adapter driver
DISPLAY.TXT	README file for display adapters	EL59X.VXD	NDIS 3 network adapter driver
DMCOLOR.DLL	Universal Printer Driver Color-Printing Support library	ELNK16.DOS	Network adapter driver
DNCRWL02.DOS	Network adapter driver	ELNK16.VXD	NDIS 3 network adapter driver
DNR.EXE	Microsoft Network component	ELNK3.DOS	Network adapter driver
DOCPROP.DLL	Docfile property extension	ELNK3.VXD	NDIS 3 network adapter driver
DOSAPP.FON	Font file	ELNKII.DOS	Network adapter driver
DOSKEY.COM	MS-DOS DosKey utility	ELNKII.VXD	NDIS 3 network adapter driver
DOSMGR.VXD	DOSMGR virtual device	ELNKMC.DOS	Network adapter driver
DOSNET.VXD	DOSNET virtual device	ELNKMC.VXD	NDIS 3 network adapter driver
DOSPRMPT.PIF	MS-DOS prompt PIF for compatibility	ELNKPL.DOS	Network adapter driver
DOSSETUP.BIN	Setup stub for setup from MS-DOS	ELPC3.VXD	NDIS 3 network adapter driver
DPTCSI.MPD	SCSI driver	EMM386.EXE	MS-DOS Emm386 memory manager utility
DRIVER.SYS	MS-DOS driver	ENABLE.INF	Setup information
DRVSPACE.BAT	Replacement stub for MS-DOS 6.x drivespace	ENABLE.VXD	Accessibility module
DRVSPACE.BIN	Doublespace/drivespace real-mode driver	ENABLE2.VXD	Accessibility module
DRVSPACE.CNT	Contents for Disk Compression help	ENABLE3.DLL	Accessibility module
DRVSPACE.EXE	Disk Compression utility	ENABLE4.VXD	Accessibility module
DRVSPACE.HLP	Disk Compression help	ENV0Y.EVY	Envoy document template
DRVSPACE.INF	Doublespace/drivespace configuration file	EPL75523.SPD	Printer driver
DRVSPACE.SYS	Doublespace/drivespace real-mode driver	EPRO.DOS	Network adapter driver
DRVSPACX.VXD	Drivespace/Doublespace virtual device	EPRO.VXD	NDIS 3 network adapter driver
DSKMAINT.DLL	Disk Utilities engine	EPSON24.DRV	Printer driver
DSNAV.NAV	Microsoft Network component	EPSON9.DRV	Printer driver
DSNED.NED	Microsoft Network component	EPSONSTY.ICM	Printer profile
DUNZIPNT.DLL	Microsoft Network component	ES1488.DRV	Electronic Switching System audio driver
DYNAPAGE.VXD	PAGEFILE virtual device	ES1488.VXD	Electronic Switching System audio driver
DZIPNT.DLL	Microsoft Network component	ES1688.DRV	Electronic Switching System audio driver
E100.DOS	Network adapter driver	ES1688.VXD	Electronic Switching System audio driver
E100.SYS	NDIS 3 driver	ES3210.DOS	Network adapter driver
E20N3.SYS	NDIS 3 driver	ES488.DRV	Electronic Switching System audio driver
E20N3.VXD	NDIS 3 driver	ES488.VXD	Electronic Switching System audio driver
E20ND.DOS	Network adapter driver	ES688.DRV	Electronic Switching System audio driver
E21N3.SYS	NDIS 3 driver	ES688.VXD	Electronic Switching System audio driver
E21ND.DOS	Network adapter driver	ESCP2MS.DRV	Printer driver
E22N3.SYS	NDIS 3 driver	ESSFM.DRV	Electronic Switching System FM synth driver

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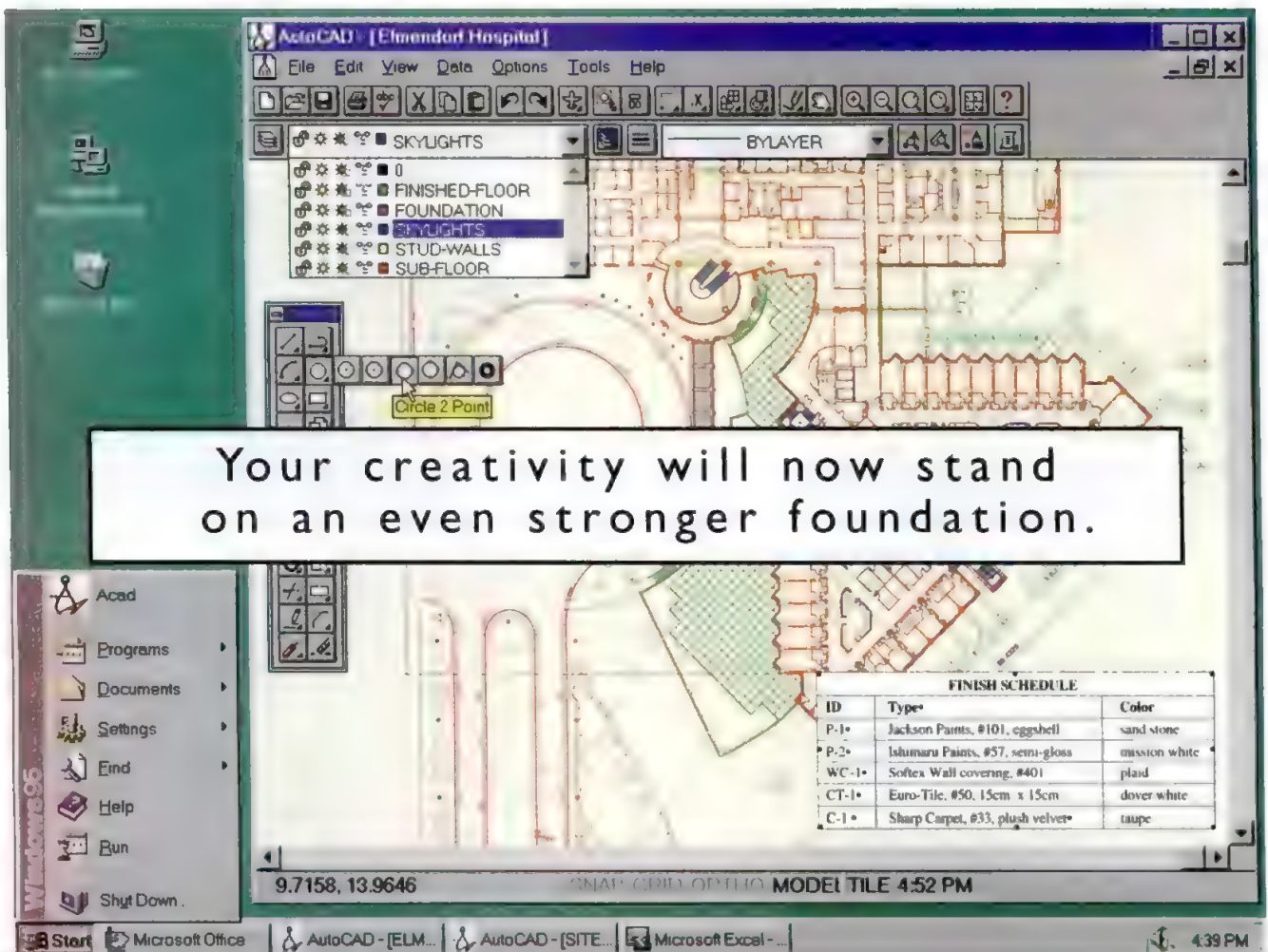
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Windows 95 Annotated File Listing

Filename	Description	Filename	Description
ESSMPORT.DRV	Electronic Switching System PIO MIDI driver	FTE.DLL	VoiceView File Transfer Engine
ESSMPU.DRV	Electronic Switching System MPU401 driver	FTMAPI.DLL	Microsoft Network component
EVX16.DOS	Network adapter driver	FTMCLEXE	Microsoft Network component
EWRK3.DOS	Network adapter driver	FTP.EXE	File Transfer Protocol TCP utility
EWRK3.SYS	Network adapter driver	FTSRCH.DLL	DLL for Windows 95 help
EXCEL.XLS	Excel 5.0 document template	FUJ124.DRV	Printer driver
EXCEL4.XLS	Excel 4.0 document template	FUJ19.DRV	Printer driver
EXCHANGE.TXT	README file for exchange	FYI.CPE	Fax cover page that reads "For your information"
EXCHNG.CNT	Contents for Mail/Exchange help	GATOR.BMP	Wallpaper bitmap
EXCHNG.HLP	Mail/Exchange component	GDI.EXE	Mini-Win 3.1 GDI for use by setup
EXCHNG32.EXE	Mail/Exchange component	GDI32.DLL	32-bit GDI
EXP16.DOS	Network adapter driver	GENERAL.IDF	General MIDI instrument
EXPLORER.EXE	32-bit Shell component	GENERAL.TXT	General README
EXPRSS24.DRV	Printer driver	GENERIC.CPE	General-purpose fax cover page
EXTRACT.EXE	Diamond decompress tool	GENFAX.APD	Microsoft Fax support
EXUTIL32.DLL	Mail/Exchange component	GOODTIMS.AVI	Sample video
F71RX503.SPD	Printer driver	GROUPOPOL.DLL	Group policy support
FAXCODEC.DLL	Fax codec	GROUPOPOL.INF	Group policy setup information
FAXCOVER.CNT	Contents for Cover Page editor help	GROUPOPOL.REG	Group policy registry
FAXCOVER.EXE	Cover Page editor	GRPCONV.EXE	Windows Program Group Converter
FAXCOVER.HLP	Cover Page editor help	GUIDE.EXE	Microsoft Network component
FAXVIEW.CNT	Contents for Fax Viewer help	GUIDENAV.NAV	Microsoft Network component
FAXVIEW.EXE	Fax Viewer	HALFTONE.BMP	Wallpaper bitmap
FAXVIEW.HLP	Fax Viewer help	HAND.ANI	Animated cursor
FC.EXE	MS-DOS File Compare utility	HELP_1.CUR	Cursor
FD16_700.MPD	SCSI driver	HELP_2.CUR	Cursor
FD8XX.MPD	SCSI driver	HELP_3.CUR	Cursor
FDISK.EXE	MS-DOS FDisk utility	HELP_4.CUR	Cursor
FILESEC.VXD	File Access Control Manager	HELP_5.CUR	Cursor
FILEXFER.CNT	Contents for File Transfer help	HELP_L.CUR	Cursor
FILEXFER.EXE	Microsoft File Transfer	HELP_M.CUR	Cursor
FILEXFER.HLP	File Transfer help	HIMEM.SYS	MS-DOS Himem driver
FILLITUP.ANI	Animated cursor	HOMEBASE.DLL	Microsoft Network component
FINDLVCL.EXE	Microsoft Network component	HONEY.BMP	Wallpaper bitmap
FINDMVI.DLL	MediaVision support	HORSE.ANI	Animated cursor
FINDSTUB.DLL	Microsoft Network component	HOSTS.SAM	TCP configuration
FINSTALL.DLL	Font installer	HOUNDS.BMP	Wallpaper bitmap
FINSTALL.HLP	Font installer help	HOURLAS.ANI	Animated cursor
FLS1MTD.VXD	PCMCIA support	HP_3D522.SPD	Printer driver
FLS2MTD.VXD	PCMCIA support	HP_3P522.SPD	Printer driver
FMPM.CNT	Contents for Win 3.1 Program Manager/File Manager help	HP1200C.ICM	Printer profile
FMPM.HLP	Win 3.1 File Manager/Program Manager help	HP1200C1.SPD	Printer driver
FONTTEXT.DLL	Font Folder Shell Extension	HP1200PS.ICM	Printer profile
FONTREG.EXE	Font Folder Component	HP3SI523.SPD	Printer driver
FONTS.INF	Setup information file for font options	HP4M_V4.SPD	Printer driver
FONTS.MFM	PostScript driver	HP4ML_V4.SPD	Printer driver
FONTVIEW.EXE	Font viewer	HP4MP_V4.SPD	Printer driver
FOREST.BMP	Wallpaper bitmap	HP4MV_V4.SPD	Printer driver
FORMAT.COM	MS-DOS disk-format utility	HP4PLUS4.SPD	Printer driver
FRAMEBUF.DRV	Super VGA display driver	HP4SI_V4.SPD	Printer driver
FREECELL.CNT	Contents for Freecell Game help	HPALERTS.DLL	HP JetAdmin support
FREECELL.EXE	Freecell Game	HPARRKUI.DLL	HP JetAdmin support
FREECELL.HLP	Freecell Game help	HPCLRLSR.ICM	Printer profile
FREELANC.PRE	Freelance document template	HPCOLA.DLL	HP JetAdmin support



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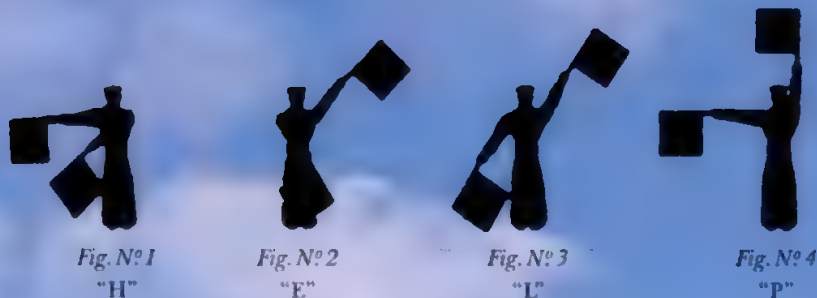
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Come See Us at Autodesk University, October 29-November 2

May we suggest some advance preparation for Windows® 95?

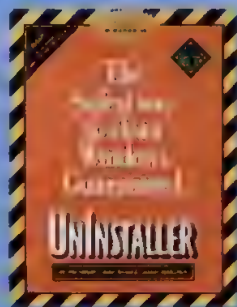


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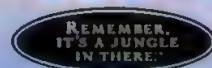


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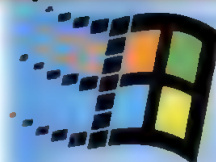
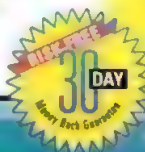
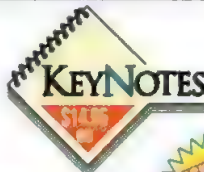
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Perfect Office Integration 3.x	\$19.95
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Camtasia 5.0 - Beg/Int/Adv	Just \$49.95
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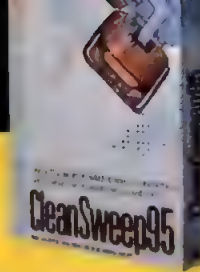
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MAIL ▶ KeyStone Learning Systems Corp.
2181 Larsen Parkway
Provo, UT 84606

ADR PMW105

Windows 95 Annotated File Listing

Filename	Description	Filename	Description
HPCOLOR.DLL	Printer driver	HPVBIT.DLL	HP JetAdmin support
HPDESK.ICM	Printer profile	HPVCM.HPM	Printer driver
HPDMIPX.DLL	HP JetAdmin support	HPVDJC.HLP	Printer driver
HPDSKJET.DRV	Printer driver	HPVIOL.DLL	Printer driver
HPEISA.VXD	Network adapter driver	HPYMON.DLL	Printer driver
HPFEND.DOS	Network adapter driver	HPVRES.DLL	Printer driver
HPFEND.VXD	Network adapter driver	HPVUI.DLL	Printer driver
HPHID522.SPD	Print driver	HPWIZ.DLL	HP JetAdmin support
HPHII522.SPD	Print driver	HPXL300.ICM	Printer profile
HPHII522.SPD	Print driver	HPXL30PS.ICM	Printer profile
HPISA.VXD	Network adapter driver	HSFLOP.PDR	HSFLOP virtual device
HPJAHL.CNT	Contents for JetAdmin program help	HTICONS.DLL	Terminal DLL
HPJD.DLL	HP JetAdmin support	HYPERTRM.CNT	Contents for Terminal help
HPJDCOM.DLL	HP JetAdmin support	HYPERTRM.DLL	Terminal DLL
HPJDMON.DLL	HP JetAdmin support	HYPERTRM.EXE	Terminal application
HPJDNF.DLL	HP JetAdmin support	HYPERTRM.HLP	Terminal help
HPJDPP.DLL	HP JetAdmin support	I82593.DOS	Network adapter driver
HPJDUI.DLL	HP JetAdmin support	IB401917.SPD	Printer driver
HPJDUND.DLL	HP JetAdmin support	IB401939.SPD	Printer driver
HPJDUND.HLP	Help file for JetAdmin program	IB402917.SPD	Printer driver
HPLAN.DOS	Network adapter driver	IB402939.SPD	Printer driver
HPLANB.DOS	Network adapter driver	IBM20470.SPD	Printer driver
HPLANE.DOS	Network adapter driver	IBM238X.DRV	Printer driver
HPLANP.DOS	Network adapter driver	IBM239X.DRV	Printer driver
HPLJ_31.SPD	Printer driver	IBM30505.SPD	Printer driver
HPLJ_3D1.SPD	Printer driver	IBM31514.SPD	Printer driver
HPLJ_3P1.SPD	Printer driver	IBM4039.SPD	Printer driver
HPLJP_V4.INF	Printer driver setup information	IBM4039P.SPD	Printer driver
HPLJP_V4.SPD	Printer driver	IBM4079.SPD	Printer driver
HPMCA.VXD	Network adapter driver	IBM5204.DRV	Printer driver
HPNETPRN.INF	HP JetAdmin support	IBMPPDSL.DRV	Printer driver
HPNETSRV.DLL	HP JetAdmin support	IBMTOK.DOS	Network adapter driver
HPNW416.DLL	HP JetAdmin support	IBMTOK.VXD	Network adapter driver
HPNW432.DLL	HP JetAdmin support	IBMTOK4.VXD	Network adapter driver
HPNWPSRV.DLL	HP JetAdmin support	ICCVIO.DLL	Video for Windows Cinepak codec
HPNWSHIM.DLL	HP JetAdmin support	ICM.INF	Image Color Matching setup information
HPPCL.DRV	Printer driver	ICM32.DLL	Image Color Matching
HPPCL5MS.DRV	Printer driver	ICMP.DLL	Image Color Matching
HPPJL.DLL	HP JetAdmin support	ICMUI.DLL	Image Color Matching user interface
HPPJEXT.DLL	HP JetAdmin support	ICONLIB.DLL	Icon Library
HPPJXL31.SPD	Printer driver	IFSHLP.SYS	Installable File System helper driver
HPPLLOT.DRV	Printer driver	IFSMGR.VXD	Installable File System Manager
HPPLLOT.HLP	Printer driver	IMAADP32.ACM	ACM codec
HPPRARRK.DLL	HP JetAdmin support	IMAGEDIT.EXE	Image Editor cursors
HPPRARRK.HLP	HP JetAdmin support	IMAGEDIT.HLP	Image Editor cursors
HPPRNTR.DLL	HP JetAdmin support	IMCLIENT.DLL	Microsoft Network component
HPPRNTR.HLP	HP JetAdmin support	IMM32.DLL	Win32 IMM application programming interface
HPPROPTY.EXE	HP Alerts MFC application	INBOX.EXC	Mail/Exchange component
HPPRRUSH.DLL	HP JetAdmin support	INDICDLL.DLL	Multilingual component
HPPRUI.DLL	HP JetAdmin support	INETMIB1.DLL	SNMP agent
HPRUSHUI.DLL	HP JetAdmin support	INFORMS.WPF	Document template
HPSNMP.DLL	HP JetAdmin support	INSTBE.BAT	Microsoft Network component
HPTABS.DLL	HP JetAdmin support	INSTL50.DLL	DEC Pathworks support
HPTRBIT.DLL	HP JetAdmin support	INSTL51.DLL	DEC Pathworks support



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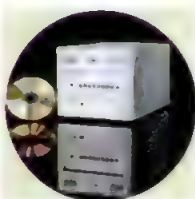
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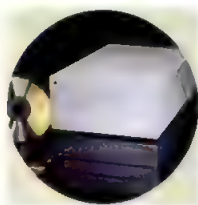
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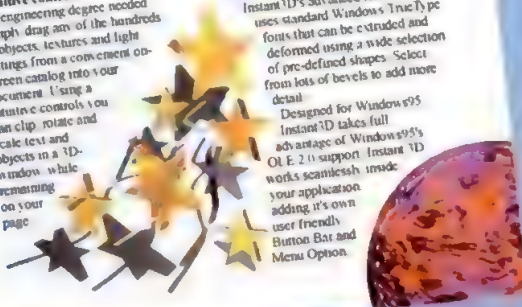
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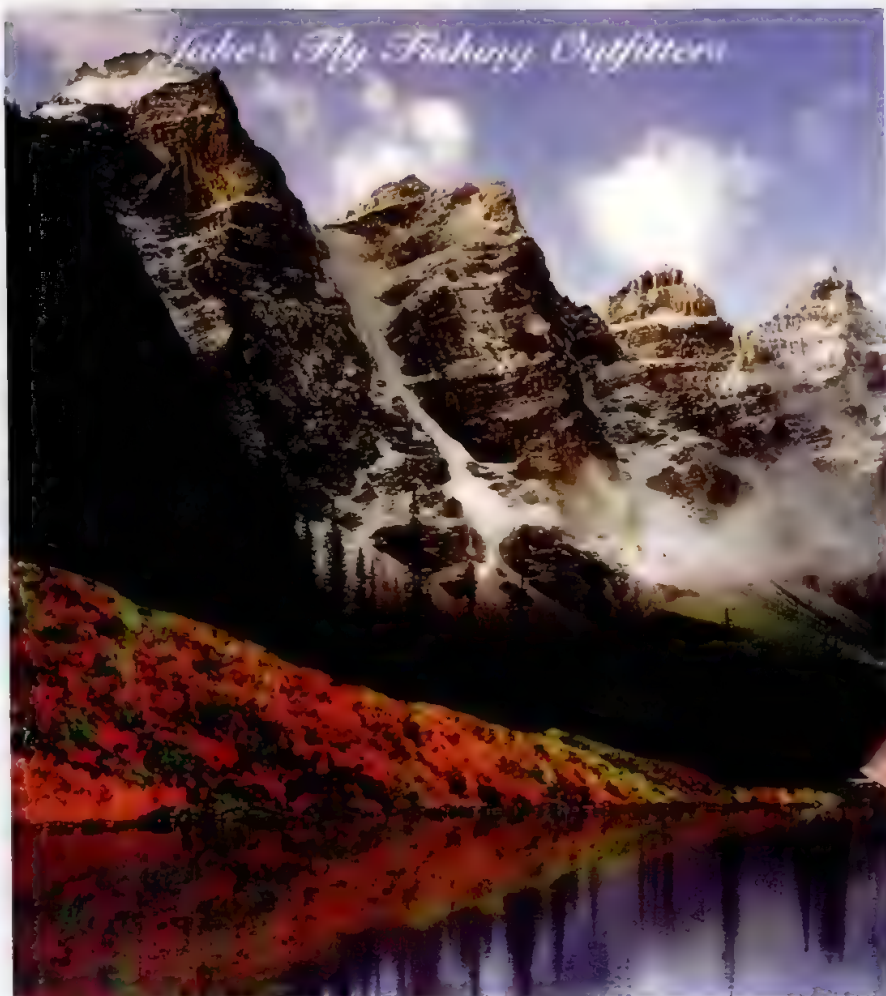
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Filename	Description	Filename	Description
INT13.VXD	INT13 virtual device	LABEL.EXE	MS-DOS Disk Label utility
INTERNAT.EXE	Multilingual component	LARIAL.TTF	Large Arial fonts
INTL.CPL	Control Panel	LARIALBD.TTF	Large Arial Bold font
IOS.INI	Network server-based setup	LARIALBI.TTF	Large Arial Bold Italic font
IOS.VXD	IOS virtual device	LARIALI.TTF	Large Arial Italic font
IOSCLASS.DLL	CD-ROM and Disk Class installer	LAYOUT.INF	Disk Layout file
IR32_32.DLL	Video for Windows Indeo codec	LCD.CPI	DOS fonts for character-mapping
IRMATR.DOS	Network adapter driver	LCOUR.TTF	Large Courier New font
IRMATRAC.VXD	Network adapter driver	LCOURBD.TTF	Large Courier New Bold font
ISAPNP.VXD	ISA Plug and Play enumerator	LCOURBI.TTF	Large Courier New Bold Italic font
ISO.CPI	DOS fonts for character mapping	LCOURI.TTF	Large Courier New Italic font
JETADMIN.CPL	Hewlett-Packard JetAdmin Control Panel applet	LEAVES.BMP	Wallpaper bitmap
JETADMIN.EXE	Hewlett-Packard JetAdmin utility	LFNBK.EXE	Long Filename Backup utility
JETADMIN.HLP	JetAdmin help	LFNBK.TXT	README file for LFNBK
JOY.CPL	Joystick Control Panel	LGINT.DLL	Microsoft Network component
JOYSTICK.INF	Multimedia setup information	LH330_1.SPD	Printer driver
JP350.DRV	Printer driver	LH530_1.SPD	Printer driver
KBDDE.KBD	Belgian keyboard layout	LH630_1.SPD	Printer driver
KBDDE.KBD	Brazilian keyboard layout	LICENSE.HLP	License Agreement help
KBDCA.KBD	French-Canadian keyboard layout	LICENSE.TXT	License Agreement text
KBDDA.KBD	Danish keyboard layout	LIGHTS.EXE	Modem Monitor applet
KBDDE.KBD	U.S. Dvorak keyboard layout	LINKINFO.DLL	Windows Volume tracking
KBDFC.KBD	Canadian bilingual keyboard layout	LMHOSTS.SAM	TCP configuration
KBDFI.KBD	Finnish keyboard layout	LMOUSE.DRV	Logitech mouse driver
KBDFR.KBD	French keyboard layout	LMOUSE.VXD	Logitech mouse driver
KBDGK.KBD	Greek keyboard layout	LMSCRIPT.EXE	LAN Manager script processor
KBDGR.KBD	German keyboard layout	LMSCRIPT.PIF	LAN Manager script processor
KBDGR1.KBD	German IBM keyboard layout	LOCALE.INF	Codepage setup information
KBDIC.KBD	Icelandic keyboard layout	LOCALE.NLS	Local information
KBDIT.KBD	Italian keyboard layout	LOGGER.VXD	Logging for Unimodem
KBDLA.KBD	Latin-American keyboard layout	LOGIN.EXE	Microsoft Windows 95 login stub for NetWare
KBDNE.KBD	Dutch keyboard layout	LOGOS.SYS	Shutdown logo
KBDNO.KBD	Norwegian keyboard layout	LOGOW.SYS	Shutdown logo
KBDPO.KBD	Portuguese keyboard layout	LOTUS.WK4	Lotus document template
KBDRU.KBD	Russian keyboard layout	LPT.VXD	Parallel port VCOMM driver
KBDSE.KBD	Swiss-French keyboard layout	LPTENUM.VXD	Parallel-port enumerator
KBDSE.KBD	Swiss-German keyboard layout	LTIMES.TTF	Large Times New Roman font
KBDSP.KBD	Spanish keyboard layout	LTIMESBD.TTF	Large Times New Roman Bold font
KBDSE.KBD	Swedish keyboard layout	LTIMESBI.TTF	Large Times New Roman Bold Italic font
KBDUK.KBD	U.K. keyboard layout	LTIMESI.TTF	Large Times New Roman Italic font
KBDUS.KBD	U.S. keyboard layout	LWNT_470.SPD	Printer driver
KBDUSX.KBD	U.S. multilingual keyboard layout	LWNTX470.SPD	Printer driver
KDCOLOR1.SPD	Printer driver	LZ32.DLL	32-bit LZ compression
KERNEL32.DLL	32-bit kernel	LZEXPAND.DLL	For Main Setup
KEYB.COM	MS-DOS KeyB utility	MACHINE.INF	Machine setup information
KEYBOARD.DRV	Win 3.1 keyboard for Setup Mini-Win 3.1	MAILMSG.DLL	Microsoft Network component
KEYBOARD.INF	Keyboard setup information file	MAILOPT.INF	Mail/MAPI Setup File for CD-only options
KEYBOARD.SYS	MS-DOS keyboard driver	MAILUTIL.DLL	Microsoft Network component
KEYBRD2.SYS	MS-DOS keyboard driver	MAIN.CPL	Main CPL
KYOCERA.DRV	Printer driver	MAINCP16.DLL	Main CPL
L100_425.SPD	Printer driver	MANTAL24.DRV	Printer driver
L200_471.SPD	Printer driver	MANTAL9.DRV	Printer driver
L300_471.SPD	Printer driver	MAPI.DLL	Mail/Exchange component
L500_493.SPD	Printer driver	MAPI32.DLL	Mail/Exchange component



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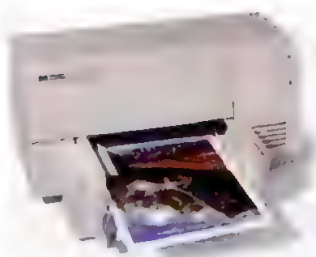
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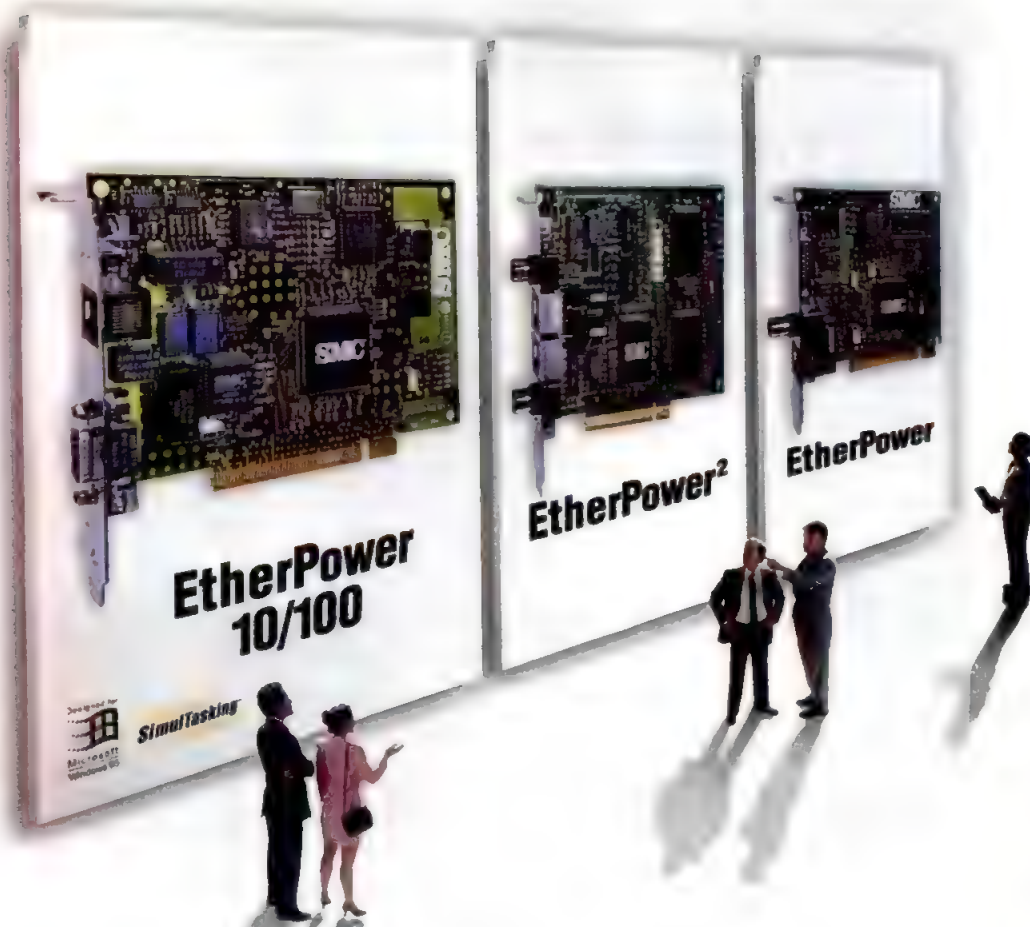
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Windows 95 Annotated File Listing

Filename	Description	Filename	Description
MAPIABM.DLL	CompuServe MAPI provider	MDMATT.INF	AT&T modem-setup information
MAPIF0.CFG	Mail/Exchange component	MDMAUS.INF	Australian modem-setup information
MAPIF0LICO	Mail/Exchange component	MDMBOCA.INF	Boca Research modem-setup information
MAPIF0S.ICO	Mail/Exchange component	MDMCOMMU.INF	Communicate modem-setup information
MAPIF1.CFG	Mail/Exchange component	MDMCPI.INF	CPI (Viva) modem-setup information
MAPIF1L.ICO	Mail/Exchange component	MDMCPL.INF	Compaq modem-setup information
MAPIF1S.ICO	Mail/Exchange component	MDMDGITN.INF	Digicom S.p.A. modem-setup information
MAPIF2.CFG	Mail/Exchange component	MDMDSI.INF	Digicom modem-setup information
MAPIF2LICO	Mail/Exchange component	MDMEURO.INF	EURO modem-setup information
MAPIF2S.ICO	Mail/Exchange component	MDMEXP.INF	EXP modem-setup information
MAPIF3.CFG	Mail/Exchange component	MDMGATEW.INF	Gateway 2000 modem-setup information
MAPIF3LICO	Mail/Exchange component	MDMGEN.INF	Generic modem-setup information
MAPIF3S.ICO	Mail/Exchange component	MDMGVC.INF	GVC modem-setup information
MAPIF4.CFG	Mail/Exchange component	MDMHAYES.INF	Hayes modem-setup information
MAPIF4LICO	Mail/Exchange component	MDMINFOT.INF	Infotel modem-setup information
MAPIF4S.ICO	Mail/Exchange component	MDMINTEL.INF	Intel modem-setup information
MAPIF5.CFG	Mail/Exchange component	MDMINTPC.INF	Intel PCMCIA modem-setup information
MAPIF5LICO	Mail/Exchange component	MDMMCOM.INF	Microcom modem-setup information
MAPIF5S.ICO	Mail/Exchange component	MDMMETRI.INF	Metricom modem-setup information
MAPIF6.CFG	Mail/Exchange component	MDMMHRTZ.INF	Megahertz modem-setup information
MAPIF6LICO	Mail/Exchange component	MDMMOTO.INF	Motorola modem-setup information
MAPIF6S.ICO	Mail/Exchange component	MDMMTS.INF	MultiTech modem-setup information
MAPIF7.CFG	Mail/Exchange component	MDMNOVA.INF	NovaLink modem-setup information
MAPIF7LICO	Mail/Exchange component	MDMOSI.INF	Ositech modem-setup information
MAPIF7S.ICO	Mail/Exchange component	MDMPACE.INF	Pace Micro modem-setup information
MAPIF8.CFG	Mail/Exchange component	MDMPNB.INF	P.N.B. modem-setup information
MAPIF8LICO	Mail/Exchange component	MDMPP.INF	Practical Peripherals modem-setup information
MAPIF8S.ICO	Mail/Exchange component	MDMRACAL.INF	Racal modem-setup information
MAPIRPC.REG	Mail/Exchange component	MDMROCK.INF	Rockwell modem-setup information
MAPISP32.EXE	Mail/Exchange component	MDMROCK2.INF	Rockwell modem-setup information
MAPISRVR.EXE	Mail/Exchange component	MDMSIER.INF	Sierra Semiconductor modem-setup information
MAPI SVC.INF	Mail/Exchange component	MDMSNITN.INF	Sysnet modem-setup information
MAPIU.DLL	Mail/Exchange component	MDMSOPIX.INF	Sonix modem-setup information
MAPIU32.DLL	Mail/Exchange component	MDMSPEC.INF	Spectrum modem-setup information
MAPIWM.TPL	Mail/Exchange component	MDMSUPRA.INF	Supra modem-setup information
MAPIX.DLL	Mail/Exchange component	MDMTDK.INF	TDK modem-setup information
MAPIX32.DLL	Mail/Exchange component	MDMTELBT.INF	Telebit modem-setup information
MARLETT.TTF	Font for System Glyphs	MDMTI.INF	Texas Instruments modem-setup information
MCIAVI.DRV	Multimedia driver	MDMTOSH.INF	Toshiba/Noteworthy modem-setup information
MCICDA.DRV	MCI CD audio driver	MDMUSRCR.INF	U.S. Robotics Courier modem-setup information
MCIOLE.DLL	MCI OLE handler	MDMUSRSP.INF	U.S. Robotics Sportster modem-setup information
MCIPIONR.DRV	MCI Laser Disc driver	MDMUSRWP.INF	U.S. Robotics WorldPort modem-setup information
MCISEQ.DRV	MCI Sequencer driver	MDMZOOM.INF	Zoom modem-setup information
MCIVISCA.DRV	MCI VCR driver	MDMZYP.INF	Zypcom modem-setup information
MCIWAVE.DRV	MCI Wave driver	MDMZYXEL.INF	ZyXEL modem-setup information
MCM.DLL	Microsoft Network component	MEM.EXE	MS-DOS MEM utility
MDGCHGO.BIN	Network adapter driver	MEMMAKER.EXE	MS-DOS MemMaker utility
MDGCHGO.VXD	Network adapter driver	MEMMAKER.HLP	MS-DOS MemMaker utility help
MDGMPORT.BIN	Network adapter driver	MEMMAKER.INF	Setup information file for MemMaker
MDGMPORT.SYS	Network adapter driver	MESH.BMP	Wallpaper bitmap
MDISP32.EXE	Mail/Exchange component	MF.INF	Multi Function Setup
MDISP32.REG	Mail/Exchange component	MF3216.DLL	Enhanced Meta File to Windows Metafile converter
MDISP32.TLB	Mail/Exchange component	MFC30.DLL	Shared MFC DLL
MDMATI.INF	ATI modem-setup information	MFCANS32.DLL	WordPad and Paint DLL



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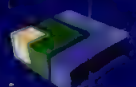
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Pivot between
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Landscape

Windows 95 Annotated File Listing

Filename	Description	Filename	Description
MFC030.DLL	Shared MFC DLL	MOSCUDDL.DLL	Microsoft Network component
MFCN30.DLL	Shared MFC DLL	MOSFIND.DLL	Microsoft Network component
MFC030.DLL	Shared MFC DLL	MOSMISC.DLL	Microsoft Network component
MFCUIA32.DLL	OLE2 Common Dialogs	MOSMUTIL.DLL	Microsoft Network component
MFCUIW32.DLL	OLE2 Common Dialogs	MOSRXP32.DLL	Microsoft Network component
MFCUIX.HLP	OLE2 Common Dialogs help	MOSSHLL.DLL	Microsoft Network component
MFOSI.INF	Ositech PCMCIA modem/Ethernet-setup information	MOSSTUB.DLL	Microsoft Network component
MGA.DRV	Matrox MGA display driver	MOSVIEW.EXE	Microsoft Network component
MGA.VXD	Matrox MGA minivdd	MOTOWN.INF	Multimedia setup information
MIDI.INF	Plug and Play MIDI device information	MOUSE.CNT	Contents for Mouse Control Panel help
MIDIMAP.CFG	MIDI Mapper configuration	MOUSE.DRV	Mouse driver
MIDIMAP.DRV	MIDI Mapper	MOUSE.HLP	Mouse Control Panel help
MKECR5XX.MPD	SCSI driver	MOUSE.TXT	README file for Mouse
MLCFG32.CPL	Mail/Exchange component	MOVE.EXE	MS-DOS Move utility
MLSET32.EXE	Mail/Exchange component	MOVE_1.CUR	Cursor
MLSHEXT.DLL	Microsoft Shell Extension Library	MOVE_2.CUR	Cursor
MMCI.DLL	Media Class Installer	MOVE_3.CUR	Cursor
MMDEVLDL.VXD	Plug and Play Dev Loader	MOVE_4.CUR	Cursor
MMDRV.HLP	Multimedia help	MOVE_5.CUR	Cursor
MMFMIG32.DLL	Mail/Exchange component	MOVE_L.CUR	Cursor
MMMIXER.DLL	Media Vision Mixer APIs	MOVE_M.CUR	Cursor
MMOPT.INF	Setup information file for CD multimedia components	MPCCL.DLL	Microsoft Network component
MMSOUND.DRV	Multimedia driver	MPLAYER.CNT	Contents for Media Player context-sensitive help
MMSYS.CPL	Multimedia CPL Applet	MPLAYER.EXE	Media Player
MMSYSTEM.DLL	Multimedia System Core	MPLAYER.HLP	Media Player help
MMTASK.TSK	Multimedia Background Task Switcher	MPR.DLL	WIN32 Network Interface DLL
MMVDIB12.DLL	Microsoft Network component	MPREXE.EXE	Win32 Network Interface Service Process
MNB22G15.ICM	Monitor profile	MPRSERV.DLL	Multinet router
MNB22G18.ICM	Monitor profile	MRCI2.VXD	Real-time compression interface
MNB22G21.ICM	Monitor profile	MSAB32.DLL	Network AddressBook for Microsoft Network
MNEBUG15.ICM	Monitor profile	MSACM.DLL	ACM core
MNEBUG18.ICM	Monitor profile	MSACM.DRV	ACM wave-mapper
MNEBUG21.ICM	Monitor profile	MSACM32.DLL	ACM core
MNP22G15.ICM	Monitor profile	MSADP32.ACM	ACM codec
MNP22G18.ICM	Monitor profile	MSBASE.INF	Setup information
MNP22G21.ICM	Monitor Profile	MSCDEX.EXE	MS-DOS MSCDEX CD-ROM Extensions utility
MODE.COM	MS-DOS Mode utility	MSCDROM.INF	Class installer setup information
MODEM.CPL	Modem Control Panel	MSD.EXE	Microsoft Diagnostics utility
MODEMS.INF	Main modem setup information	MSD.INI	Microsoft Diagnostics initialization
MODEMUI.DLL	Unimodem property sheet	MSDET.INF	System Detection setup information
MONITOR.INF	Monitor setup information	MSDISP.INF	Display setup information
MONITOR2.INF	Monitor setup information	MSDLC.EXE	Data Link Control protocol
MONITOR3.INF	Monitor setup information	MSDOS.INF	Setup information
MONITOR4.INF	Monitor setup information	MSFDC.INF	Floppy disk controller setup information
MORE.COM	MS-DOS More utility	MSFS.CNT	Contents for Mail/Exchange Internet help
MORICONS.DLL	MS-DOS application icons	MSFS.HLP	Mail/Exchange Internet component
MOS.INF	Microsoft Network component	MSFS32.DLL	Mail/Exchange component
MOSABP32.DLL	Microsoft Network component	MSG711.ACM	ACM codec
MOSAFD.DLL	Microsoft Network component	MSGSM32.ACM	ACM codec
MOSCC.DLL	Microsoft Network component	MSGSRV32.EXE	Windows 32-bit virtual device message system
MOSCFG32.DLL	Microsoft Network component	MSHDC.INF	Hard disk controller setup information
MOSCL.DLL	Microsoft Network component	MSHEARTS.CNT	Contents for Hearts help
MOSCOMP.DLL	Microsoft Network component	MSHEARTS.EXE	Hearts game
MOSCP.EXE	Microsoft Network component	MSHEARTS.HLP	Hearts help

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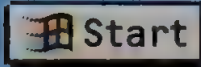
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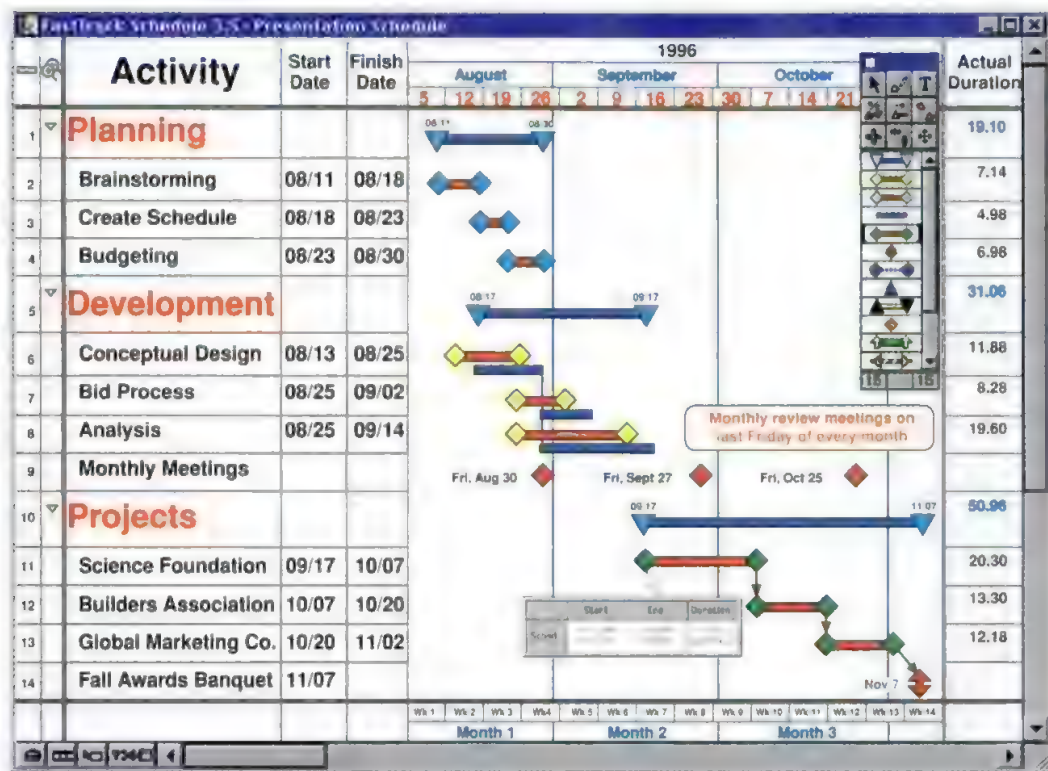
Microsoft
Windows 95
Compatible



Windows 95 Annotated File Listing

Filename	Description	Filename	Description
MSJSTICK.DRV	Plug and Play joystick driver	MTLITE.DRV	Printer driver
MSMAIL.INF	Mail/MAPI setup	MTMMINIP.MPD	SCSI driver
MSMIXMGR.DLL	Microsoft Audio Mixer Manager	MULLANG.INF	Multi-language font-support setup information
MSMOUSE.INF	Mouse setup information	MULTILNG.INF	Multilingual content setup information
MSMOUSE.VXD	MS Mouse minidriver	MUSICA-1.WAV	Sample audio file
MSMPU401.DRV	MPU MIDI Driver	MUSICA-2.WAV	Sample audio file
MSMPU401.VXD	MPU MIDI Driver	MUSICA-3.WAV	Sample audio file
MSN.CNT	Microsoft Network help	MUSICA-4.WAV	Sample audio file
MSN.HLP	Microsoft Network component	MUSICAAS.WAV	Sample audio file
MSN.MSN	Microsoft Network component	MUSICACL.WAV	Sample audio file
MSN.TXT	README file for Microsoft Network	MUSICACR.WAV	Sample audio file
MSNBS.HLP	Microsoft Network component	MUSICADE.WAV	Sample audio file
MSNCHAT.HLP	Microsoft Network component	MUSICAER.WAV	Sample audio file
MSNDUI.DLL	Microsoft Network component	MUSICAEX.WAV	Sample audio file
MSNET.DRV	Microsoft Network real-mode client	MUSICAMA.WAV	Sample audio file
MSNET32.DLL	Microsoft 32-bit Network API Library	MUSICAME.WAV	Sample audio file
MSNEXCH.EXE	Microsoft Network setup program	MUSICAMI.WAV	Sample audio file
MSNFIND.EXE	Microsoft Network Find program	MUSICAOP.WAV	Sample audio file
MSNFULL.HLP	Microsoft Network help	MUSICAQU.WAV	Sample audio file
MSNINT.HLP	Microsoft Network help	MUSICAWI.WAV	Sample audio file
MSNMAIL.HLP	Microsoft Network help	MVCL14N.DLL	MediaView API Library
MSNP32.DLL	Network provider for Microsoft Network	MVI401.DRV	MediaVision ProAudio MPU401
MSNPSS.CNT	Contents for Microsoft Network help	MVI514MX.DRV	MediaVision ProAudio Spectrum
MSNPSS.HLP	Microsoft Network help	MVIFM.DRV	MediaVision FM Synthesis
MSNVER.TXT	Version information for Microsoft Network	MVIFM.PAT	MediaVision FM Patches
MSODISUP.VXD	Windows ODI to NDIS Mapper	MVIWAVE.DRV	Audio driver
MSOPL.DRV	OPL driver	MVMIXER.DRV	MediaVision ProAudio Spectrum driver
MSOPL.VXD	MSOPL virtual device	MVPAS.VXD	MediaVision Multifunction device
MSPAINC.CNT	Contents for Paint help	MVPR14N.DLL	MediaView Image Library
MSPAINC.EXE	Paint applet	MVPROAUD.DRV	MediaVision ProAudio Spectrum driver
MSPAINC.HLP	Paint help	MVTTL14C.DLL	Viewer Title API Library
MSPCIC.DLL	PCMCIA Class Installer and Control Panel Applet	MVUT14N.DLL	MediaView Utility Library
MSPORTS.INF	Comm setup information	N2090522.SPD	Printer driver
MSPPP32.DLL	Print provider for Microsoft Network	N2290520.SPD	Printer driver
MSPST32.DLL	Mail/Exchange component	N890_470.SPD	Printer driver
MSPWL32.DLL	Password list management library	N890X505.SPD	Printer driver
MSRLE32.DLL	Run Length encoded codec driver	NAL.DLL	Network monitor agent SMS client
MSSBLST.DRV	Sound Blaster driver	NATURE-1.WAV	Sample audio file
MSSBLST.VXD	Sound Blaster driver	NATURE-2.WAV	Sample audio file
MSSHRUI.DLL	Shell extensions for sharing	NATUREAS.WAV	Sample audio file
MSSNDSYS.DRV	Windows Sound System driver	NATURECL.WAV	Sample audio file
MSSNDSYS.VXD	Windows Sound System VxD	NATURECR.WAV	Sample audio file
MSSOUND.WAV	Microsoft startup sound wave	NATUREDE.WAV	Sample audio file
MSSP.VXD	Pass-through security provider for Windows NT	NATUREER.WAV	Sample audio file
MSTCP.DLL	TCP user interface	NATUREEX.WAV	Sample audio file
MSUCIARE.WAV	Sample wave file	NATUREMA.WAV	Sample audio file
MSVCRT20.DLL	WordPad and Paint DLL	NATUREME.WAV	Sample audio file
MSVFW32.DLL	Video for Windows Runtime	NATUREMI.WAV	Sample audio file
MSVIDC32.DLL	Video for Windows Video 1 codec	NATUREOP.WAV	Sample audio file
MSVIDEO.DLL	Video for Windows Runtime	NATUREQU.WAV	Sample audio file
MSVIEWUT.DLL	Service data-link libraries for display engines	NATURERE.WAV	Sample audio file
MSWD6_32.WPC	WinWord 6 converter for WordPad	NATUREWI.WAV	Sample audio file
MT_T1101.SPD	Printer driver	NBTSTAT.EXE	TCP utility
MTD.INF	PCMCIA flash-card setup information	NCC16.DOS	Network adapter driver

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Windows
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CIRCLE 258 ON READER SERVICE CARD

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MONDAY 24

TO DO AND WORK RECORD

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STAFF MEETING ✓

GET INVENTORY STATUS ✓

LUNCH WITH FRANK

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CIRCLE 070 ON READER SERVICE CARD

**WIN 95
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Windows 95 Annotated File Listing

Filename	Description	Filename	Description
NCCPS401.SPD	Printer driver	NETFLX.BIN	Network adapter driver
NCCPS801.SPD	Printer driver	NETFLX.DOS	Network adapter driver
NCOL_519.SPD	Printer driver	NETFLX.SYS	Network adapter driver
NCR53C9X.MPD	SCSI driver	NETGEN.INF	Network adapter driver
NCRC700.MPD	SCSI driver	NETH.MSG	Network client help messages
NCRC710.MPD	SCSI driver	NETHP.INF	Network setup information
NCRC810.MPD	SCSI driver	NETIBM.INF	Network setup information
NCRSDMS.MPD	SCSI driver	NETIBMCC.INF	Network setup information
NCS29901.SPD	Printer driver	NETMADGE.INF	Network setup information
NCSW_951.SPD	Printer driver	NETMON.386	Network monitor agent SMS client
NDDEAPI.DLL	Windows for Workgroups DDE Share interface	NETMON.INF	Network monitor agent SMS client
NDDENB.DLL	Microsoft Windows Network DDE NetBIOS interface	NETNCR.INF	Network setup information
NDIS.VXD	Windows NDIS 3.1 Wrapper	NETNICE.INF	Network setup information
NDIS2SUP.VXD	Windows NDIS Real-Mode Mapper	NETNOVEL.INF	Network setup information
NDIS30.DLL	Network monitor agent SMS client	NETOLI.INF	Network setup information
NDIS39XR.DOS	Network adapter driver	NETOS.DLL	NOS Detection DLL
NDIS89XR.DOS	Network adapter driver	NETOSI.INF	Network setup information
NDISHLP.SYS	Real-mode NDIS support driver	NETPPP.INF	Network setup information
NE1000.DOS	Network adapter driver	NETPROT.INF	Network setup information
NE1000.SYS	Network adapter driver	NETRACAL.INF	Network setup information
NE2000.DOS	Network adapter driver	NETSERVER.INF	Network setup information
NE2000.SYS	Network adapter driver	NETSETUP.ADM	Network server-based setup
NE3200.BIN	Network adapter driver	NETSETUP.DLL	Network server-based setup
NE3200.DOS	Network adapter driver	NETSETUP.EXE	Network server-based setup
NE3200.SYS	Network adapter driver	NETSETUP.INF	Network server-based setup
NEC24PIN.DRV	Printer driver	NETSETUP.LAY	Network server-based setup
NECATAPI.VXD	NEC ATAPI Helper driver	NETSILC.INF	Network setup information
NET.EXE	Real-mode network client software	NETSMC.INF	Network setup information
NET.INF	Net Detection information	NETSMC32.INF	Network setup information
NET.MSG	Network client message	NETSMCTR.INF	Network setup information
NET3COM.INF	Network setup information	NETSNIP.INF	Network setup information
NETAMD.INF	Network setup information	NETSOCK.INF	Network setup information
NETAPI.DLL	Network API	NETSTAT.EXE	TCP/IP NETSTAT command
NETAPI32.DLL	32-bit network API DLL	NETSUSRC.INF	Network setup information
NETAUXT.INF	MS internal transports	NETTCC.INF	Network setup information
NETBEUI.VXD	32-bit NetBEUI protocol	NETTDKP.INF	Network setup information
NETBIOS.DLL	NetBIOS API Library	NETTRANS.INF	Network setup information
NETBW.INF	Network setup information	NETTULIP.INF	Network setup information
NETCABLE.INF	Network setup information	NETUB.INF	Network setup information
NETCD.INF	Network setup information	NetWare.MS	NetWare stubs
NETCDA.INF	Network setup information	NETWATCH.CNT	Contents for NetWatcher help
NETCEM.INF	Network setup information	NETWATCH.EXE	Net Watcher
NETCLI.INF	Network setup information	NETWATCH.HLP	Net Watcher help
NETCLI3.INF	Network setup information	NETWORK.HLP	Network help file
NETCPL.CPL	Network Control Panel	NETWORK.TXT	README file for network information
NETCPQ.INF	Network setup information	NETXIR.INF	Network setup information
NETDOE.EXE	Windows Network Dynamic Data Exchange	NETZNOTE.INF	Network setup information
NETDEC.INF	Network setup information	NI5210.DOS	Network adapter driver
NETDEF.INF	Network setup information	NI6510.DOS	Network adapter driver
NETDET.INI	NetWare detection	NICE.VXD	Windows Virtual NICE PCMCIA Network Card driver
NETDI.DLL	Net Device Installer	NLSFUNC.EXE	National Language Support utility
NETEE16.INF	Network setup information	NM95SETP.DLL	Network monitor agent/SMS client
NETEVX.INF	Network setup information	NMAGENT.EXE	Network monitor agent/SMS client
NETFLEX.INF	Network setup information	NMAGENT.INF	Network monitor agent/SMS client

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Windows 95 Annotated File Listing

Filename	Description	Filename	Description
NMSUPP4.386	Network monitor agent/SMS client	OLEDLG.DLL	Microsoft Windows OLE 2.0 User Interface support
NMTHUNK.DLL	Network monitor agent/SMS client	OLESVR.DLL	Object Linking and Embedding Server Library
NO_1.CUR	Cursor	OLESVR32.DLL	Win32 OLESVR32 core component
NO_2.CUR	Cursor	OLETHK32.DLL	OLE Thunk Library
NO_3.CUR	Cursor	OLIDM24.DRV	Printer driver
NO_4.CUR	Cursor	OLIDM9.DRV	Printer driver
NO_5.CUR	Cursor	OLITOK.DOS	Network adapter driver
NO_L.CUR	Cursor	OLITOK16.DOS	Network adapter driver
NO_M.CUR	Cursor	ONLSTMT.EXE	Microsoft Network component
NODRIVER.INF	Plug and Play device information	ONLSTMT.HLP	Microsoft Network component
NOTEPAD.CNT	Contents for Notepad help	P351SX2.DRV	Printer driver
NOTEPAD.EXE	Notepad	P4455514.SPD	Printer driver
NOTEPAD.HLP	Notepad help	PA3DMXD.DRV	MediaVision ProAudio 3D Mixer driver
NSCL.VXD	NSCL virtual device	PACKAGER.CNT	Contents for Packager help
NTDLL.DLL	Win32 NTDLL core component	PACKAGER.EXE	Packager applet
NW16.DLL	NetWare client	PACKAGER.HLP	Packager help
NWAB32.DLL	Address book provider	PAGESWAP.VXD	PAGESWAP virtual device
NWLINK.VXD	32-bit IPX/SPX-compatible protocol	PAINTJET.DRV	Printer driver
NWLSCON.EXE	Login-script console	PANMAP.DLL	PANOSE Font Mapper
NWLSPROC.EXE	NetWare login processor	PANSON24.DRV	Printer driver
NWNBLINK.VXD	NetBIOS for IPX/SPX-compatible protocol	PANSON9.DRV	Printer driver
NWNET32.DLL	NetWare client	PAP54001.SPD	Printer driver
NWNP32.DLL	NetWare component	PAP54101.SPD	Printer driver
NWPP32.DLL	NetWare component	PARALINK.VXD	Remote Network Access parallel-port driver
NWREDIR.VXD	NetWare redirector	PARITY.VXD	PARITY virtual device
NWRPLTRM.COM	ROLM processing language support	PASSPORT.MID	Sample MIDI file
NWSERVER.VXD	NCP server	PASSWORD.CPL	Password Control Panel
NWSP.VXD	NCP server security provider	PBRUSH.EXE	Stub for Win 3.x Paintbrush
O5241503.SPD	Printer driver	PC2X.MPD	SCSI driver
O5242503.SPD	Printer driver	PCCARD.VXD	PCMCIA support
OAK.VXD	Oak Technology minivdd	PCI.VXD	PCI bus driver
OCTK16.SYS	NDIS3 driver	PCMCIA.INF	PCMCIA setup
OCTK32.VXD	NDIS 3 driver	PCNTN3.VXD	Network adapter driver
ODIHLPEX.E	NetWare client	PCNTND.DOS	Network adapter driver
OKI24.DRV	Printer driver	PCSA.EXE	DEC Pathworks support file
OKI830US.SPD	Printer driver	PE2NDIS.DOS	Network adapter driver
OKI840US.SPD	Printer driver	PE3NDIS.EXE	Network adapter driver
OKI850US.SPD	Printer driver	PE3NDIS.VXD	Network adapter driver
OKI9.DRV	Printer driver	PEN_1.CUR	Cursor
OKI9IBM.DRV	Printer driver	PEN_2.CUR	Cursor
OKOL8701.SPD	Printer driver	PEN_3.CUR	Cursor
OL830525.SPD	Printer driver	PEN_4.CUR	Cursor
OL840518.SPD	Printer driver	PEN_5.CUR	Cursor
OL850525.SPD	Printer driver	PEN_L.CUR	Cursor
OLE2.DLL	OLE 2.0	PEN_M.CUR	Cursor
OLE2.INF	OLE setup information	PENDIS.DOS	Network adapter driver
OLE2CONV.DLL	QuickDraw Graphic Import filter	PERF.VXD	System Performance Monitor
OLE2DISP.DLL	OLE 2.1 16/32 Interoperability Library	PHIIPX.SPD	Printer driver
OLE2NLS.DLL	OLE 2.1 16/32 Interoperability Library	PHONE.PBK	Microsoft Network component
OLE32.DLL	32-bit OLE 2.0 component	PIANO.ANI	Animated cursor
OLEAUT32.DLL	OLE 2-32 automation	PIFCONV.EXE	Support for MS-DOS mode
OLECLI.DLL	Object Linking and Embedding Client Library	PIFMGR.DLL	Program Information File Management services
OLECLI32.DLL	Win32 OLECLI32 core component	PING.EXE	TCP Ping utility
OLECNV32.DLL	32-bit OLE 2.0 component	PJLMON.DLL	PostScript bidirectional port monitor

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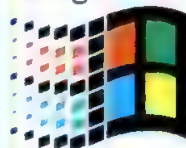
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CIRCLE 214 ON READER SERVICE CARD

First to Span the Globe



Designed for



Microsoft®
Windows®95



GLOBAL
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Windows 95 Annotated File Listing

Filename	Description	Filename	Description
PKPD.DLL	Ink support for PenWin	QIC117.VXD	Backup applet virtual device
PKPD32.DLL	32-bit ink support for PenWin	QM1700_1.SPD	Printer driver
PMSPL.DLL	LAN Manager application programming interface	QM2000_1.SPD	Printer driver
POINTER.DLL	MS Mouse support	QM825MR1.SPD	Printer driver
POINTER.EXE	MS Mouse support	QMPS4101.SPD	Printer driver
POEDIT.CNT	Contents for System Policy editor help	QMS10030.ICM	Printer profile
POEDIT.EXE	System Policy editor	QMS1725.SPD	Printer driver
POEDIT.HLP	System Policy editor help	QMS3225.SPD	Printer driver
POEDIT.INF	System Policy editor setup information	QMS420.SPD	Printer driver
POWER.DRV	Advanced Power Management driver	QMS45252.SPD	Printer driver
POWERCFG.DLL	Advanced Power Management Control Panel	QMS860.SPD	Printer driver
POWERPNT.PPT	Power Point document template	QMS8P461.SPD	Printer driver
PPM.VXD	Microcom parallel port modem driver	QMSCS210.SPD	Printer driver
PPPMAC.VXD	Windows Virtual PPP driver	QMSCS230.SPD	Printer driver
PRECOPY.INF	Information file used by setup.exe stub	QUATTRO.WB2	Quattro document template
PRESENTA.SHW	Document template	QUIETJET.DRV	Printer driver
PRINT.EXE	MS-DOS Print utility	QUIKVIEW.EXE	Quick View
PRINTERS.TXT	README file for Printers information	QWIII.DRV	Printer driver
PRO4.DOS	Network adapter driver	RAINBOW.ANI	Animated cursor
PRO4AT.DOS	Network adapter driver	RAMDRIVE.SYS	MS-DOS RAM Drive driver
PRODINV.DLL	Microsoft Network component	RASAPI16.DLL	Remote Access Services 16-bit API Library
PROGMAN.CNT	Contents for Program Manager help	RASAPI32.DLL	Remote Access Services 32-bit API Library
PROGMAN.EXE	Program Manager	RCV0000.EFX	Information about SprintFax services
PROGMAN.HLP	Program Manager help	README.TXT	README file for Windows 95
PROPRINT.DRV	Printer driver	REBOOT.VXD	REBOOT virtual device
PROPRN24.DRV	Printer driver	REDBRICK.BMP	Wallpaper bitmap
PRORAPM.DWN	Network adapter driver	REDIR32.EXE	Console App Redirection utility
PROTEON.VXD	Network adapter driver	REDIRECT.MOD	Console App Redirection utility
PROTMAN.DOS	Network adapter driver	REDTILE.BMP	Wallpaper bitmap
PROTMAN.EXE	Real-mode NDIS protocol manager	REGEDIT.CNT	Contents for RegEdit help
PRTUPD.INF	Printer upgrade setup information	REGEDIT.EXE	Registry editor
PS1.DRV	Printer driver	REGEDIT.HLP	Registry editor help
PS4079.ICM	Printer profile	REGSERV.EXE	Remote registry
PSCRIPT.DRV	PostScript Printer driver	REGSRV.INF	Remote registry
PSCRIPT.HLP	PostScript printer driver help	REGWIZ.EXE	Registration wizard
PSCRIPT.INI	PostScript .INI file information	RESTORE.EXE	MS-DOS Restore utility for MS-DOS 6.x backup
PSMON.DLL	PS BiDi port monitor	RICHED.DLL	Rich Edit DLL for use with WritePad
PSTRIPE.BMP	Wallpaper bitmap	RICHED32.DLL	Rich Edit Control
PYRAMID2.BMP	Wallpaper bitmap	RINGIN.WAV	Audio file
Q2200_MS.SPD	Printer driver	RINGOUT.WAV	Audio file
Q2210_MS.SPD	Printer driver	RIVETS.BMP	Wallpaper bitmap
Q2220523.SPD	Printer driver	RIVETS2.BMP	Wallpaper bitmap
Q800_MS.SPD	Printer driver	RMM.PDR	RMM virtual device
Q810_MS.SPD	Printer driver	RNA.INF	Used by Setup to install Remote Network Access
Q810T_MS.SPD	Printer driver	RNAAPP.EXE	Dial-up networking application
Q820_MS.SPD	Printer driver	RNAL.DLL	Network monitor agent SMS client
Q820T517.SPD	Printer driver	RNANP.DLL	Dial-Up Networking Notifier
Q860PLS2.SPD	Printer driver	RNAPLUS.INF	Setup information file for SLIP and dial-up script support
QBASIC.EXE	Microsoft QBasic interpreter	RNASERV.DLL	Remote Network Access server
QBASIC.HLP	Microsoft QBasic help	RNASETUP.DLL	Remote Network Access setup DLL
QCS1000.SPD	Printer driver	RNATHUNK.DLL	Remote Network Access Thunk Support DLL
QCS10503.SPD	Printer driver	RNAUI.DLL	Remote Network Access user interface DLL
QCS30503.SPD	Printer driver	RNDSRV32.DLL	Render server
QEMMFIX.VXD	Fix for older versions of QEMM	ROBOTZAS.WAV	Sample sound file



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Windows 95 Annotated File Listing

Filename	Description	Filename	Description
NCCPS401.SPD	Printer driver	NETFLX.BIN	Network adapter driver
NCCPS801.SPD	Printer driver	NETFLX.DOS	Network adapter driver
NCOL_519.SPD	Printer driver	NETFLX.SYS	Network adapter driver
NCR53C9X.MPD	SCSI driver	NETGEN.INF	Network adapter driver
NCRC700.MPD	SCSI driver	NETH.MSG	Network client help messages
NCRC710.MPD	SCSI driver	NETHP.INF	Network setup information
NCRC810.MPD	SCSI driver	NETIBM.INF	Network setup information
NCRSDMS.MPD	SCSI driver	NETIBMCC.INF	Network setup information
NCS29901.SPD	Printer driver	NETMADGE.INF	Network setup information
NCSW_951.SPD	Printer driver	NETMON.386	Network monitor agent SMS client
NDDEAPI.DLL	Windows for Workgroups DDE Share interface	NETMON.INF	Network monitor agent SMS client
NDDENB.DLL	Microsoft Windows Network DDE NetBIOS interface	NETNCR.INF	Network setup information
NDIS.VXD	Windows NDIS 3.1 Wrapper	NETNICE.INF	Network setup information
NDIS2SUP.VXD	Windows NDIS Real-Mode Mapper	NETNOVEL.INF	Network setup information
NDIS30.DLL	Network monitor agent SMS client	NETOLI.INF	Network setup information
NDIS39XR.DOS	Network adapter driver	NETOS.DLL	NOS Detection DLL
NDIS89XR.DOS	Network adapter driver	NETOSI.INF	Network setup information
NDISHLP.SYS	Real-mode NDIS support driver	NETPPP.INF	Network setup information
NE1000.DOS	Network adapter driver	NETPROT.INF	Network setup information
NE1000.SYS	Network adapter driver	NETRACAL.INF	Network setup information
NE2000.DOS	Network adapter driver	NETSERVER.INF	Network setup information
NE2000.SYS	Network adapter driver	NETSETUP.ADM	Network server-based setup
NE3200.BIN	Network adapter driver	NETSETUP.DLL	Network server-based setup
NE3200.DOS	Network adapter driver	NETSETUP.EXE	Network server-based setup
NE3200.SYS	Network adapter driver	NETSETUP.INF	Network server-based setup
NEC24PIN.DRV	Printer driver	NETSETUP.LAY	Network server-based setup
NECATAPI.VXD	NEC ATAPI Helper driver	NETSILC.INF	Network setup information
NET.EXE	Real-mode network client software	NETSMC.INF	Network setup information
NET.INF	Net Detection information	NETSMC32.INF	Network setup information
NET.MSG	Network client message	NETSMCTR.INF	Network setup information
NET3COM.INF	Network setup information	NETSNIP.INF	Network setup information
NETAMD.INF	Network setup information	NETSOCK.INF	Network setup information
NETAPI.DLL	Network API	NETSTAT.EXE	TCP/IP NETSTAT command
NETAPI32.DLL	32-bit network API DLL	NETSUSRC.INF	Network setup information
NETAUXT.INF	MS internal transports	NETTCC.INF	Network setup information
NETBEUI.VXD	32-bit NetBEUI protocol	NETTDKP.INF	Network setup information
NETBIOS.DLL	NetBIOS API Library	NETTRANS.INF	Network setup information
NETBW.INF	Network setup information	NETTULIP.INF	Network setup information
NETCABLE.INF	Network setup information	NETUB.INF	Network setup information
NETCD.INF	Network setup information	NetWare.MS	NetWare stubs
NETCDA.INF	Network setup information	NETWATCH.CNT	Contents for NetWatcher help
NETCEM.INF	Network setup information	NETWATCH.EXE	Net Watcher
NETCLI.INF	Network setup information	NETWATCH.HLP	Net Watcher help
NETCLI3.INF	Network setup information	NETWORK.HLP	Network help file
NETCPL.CPL	Network Control Panel	NETWORK.TXT	README file for network information
NETCPQ.INF	Network setup information	NETXIR.INF	Network setup information
NETDDE.EXE	Windows Network Dynamic Data Exchange	NETZNOTE.INF	Network setup information
NETDEC.INF	Network setup information	NI5210.DOS	Network adapter driver
NETDEF.INF	Network setup information	NI6510.DOS	Network adapter driver
NETDET.INI	NetWare detection	NICE.VXD	Windows Virtual NICE PCMCIA Network Card driver
NETDI.DLL	Net Device Installer	NLSFUNC.EXE	National Language Support utility
NETEE16.INF	Network setup information	NM95SETP.DLL	Network monitor agent/SMS client
NETEVX.INF	Network setup information	NMAGENT.EXE	Network monitor agent/SMS client
NETFLEX.INF	Network setup information	NMAGENT.INF	Network monitor agent/SMS client

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1. The first part of the document is a header section containing the title "THE EFFECTS OF THE 1997-1998 EL NIÑO ON THE
 2. FISHING INDUSTRY IN THE STATE OF CALIFORNIA" and the author's name "J. R. HART".
 3. The second part is the abstract, which states: "The 1997-1998 El Niño event had a significant impact on the fishing industry in the State of California. The effects were most pronounced in the commercial fishing sector, where catches of many species were reduced. The recreational fishing sector also experienced some impacts, but they were generally less severe. The overall economic impact on the fishing industry was negative, with many fishermen experiencing reduced income and some losing their livelihoods. The government and the fishing industry are working to develop strategies to mitigate the effects of future El Niño events."

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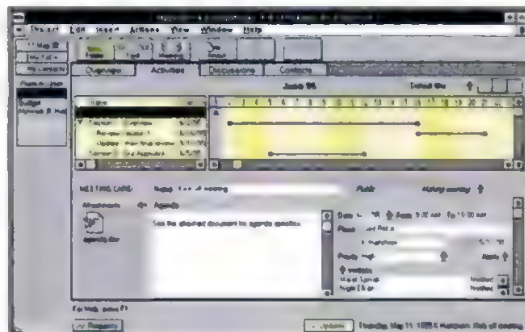
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Windows 95 Annotated File Listing

Filename	Description	Filename	Description
SIZE3_1.CUR	Cursor	SPAP.VXD	Shiva PAP virtual driver
SIZE3_2.CUR	Cursor	SPARROW.MPD	SCSI driver
SIZE3_3.CUR	Cursor	SPARROWX.MPD	SCSI driver
SIZE3_4.CUR	Cursor	SPLITTER.VXD	NetBIOS gateway group name-splitter
SIZE3_5.CUR	Cursor	SPOCK.MPD	SCSI driver
SIZE3_L.CUR	Cursor	SPOOL32.EXE	Printer support
SIZE3_M.CUR	Cursor	SPOOLER.VXD	Print-sharing virtual device
SIZE4_1.CUR	Cursor	SPOOLSS.DLL	Spooler Sub System DLL
SIZE4_2.CUR	Cursor	SQUARES.BMP	Wallpaper bitmap
SIZE4_3.CUR	Cursor	SRAMMTD.VXD	PCMCIA support
SIZE4_4.CUR	Cursor	SSERIFE.FON	Font file
SIZE4_5.CUR	Cursor	SSERIFF.FON	Font file
SIZE4_L.CUR	Cursor	SSFLYWIN.SCR	Screen saver
SIZE4_M.CUR	Cursor	SSMARQUE.SCR	Screen saver
SIZENESW.ANI	Animated cursor	SSMYST.SCR	Screen saver
SIZENS.ANI	Animated cursor	SSSTARS.SCR	Screen saver
SIZENWSE.ANI	Animated cursor	STAR24E.DRV	Printer driver
SIZEWE.ANI	Animated cursor	STAR9E.DRV	Printer driver
SKPSFA_1.SPD	Printer driver	START.EXE	Program Starter
SLAN.DOS	Network adapter driver	STATE.PBK	Microsoft Network component
SLCD32.MPD	SCSI driver	STDOLE.TLB	OLE 2.0 file
SLENH.DLL	Advanced power management options	STDOLE32.TLB	OLE 2-32 file
SMALLE.FON	Font file	STEM0409.DLL	DLL used for Windows 95 help
SMALLF.FON	Font file	STLS04SS.SPD	Printer driver
SMARTDRV.EXE	MS-DOS startup utility	STLS08LP.SPD	Printer driver
SMARTND.DOS	Network adapter driver	STLS5TTU.SPD	Printer driver
SMC_ARC.DOS	Network adapter driver	STORAGE.DLL	OLE Storage Management Library
SMC3000.DOS	Network adapter driver	STRN.DOS	Network adapter driver
SMC8000.DOS	Network adapter driver	SUBST.EXE	MS-DOS Subst utility
SMC8000W.VXD	Network adapter driver	SUEXPAND.DLL	Setup LZ DLL
SMC80PC.VXD	Network adapter driver	SUFAIL.BAT	SmartRecovery warning
SMC8100.DOS	Network adapter driver	SUHELPER.BIN	Setup support
SMC8100W.VXD	Network adapter driver	SUPERVGA.DRV	Super VGA display driver
SMC8232.DOS	Network adapter driver	SUPPORT.TXT	PSS support info
SMC8232W.VXD	Network adapter driver	SVCPROP.DLL	Microsoft Network component
SMC9000.DOS	Network adapter driver	SVRAPI.DLL	32-bit Common Server API Library
SMC9000.VXD	Network adapter driver	SXCIEXT.DLL	Matrox display driver support file
SNAPSHOT.EXE	Snapshot	SYMBOL.TTF	Symbol font
SNAPSHOT.VXD	Snapshot virtual device	SYMBOLE.FON	Font file
SNDREC32.EXE	Sound recorder	SYMBOLF.FON	Font file
SNDVOL32.CNT	Contents for Mixer Controls context-sensitive help	SYNCENG.DLL	32-bit file sync engine
SNDVOL32.EXE	Mixer Controls	SYNCUI.DLL	Briefcase DLL
SNDVOL32.HLP	Mixer Controls help	SYNTHGM.SBK	Sound Blaster AWE general MIDI wavetable
SNIP.VXD	Network adapter driver	SYS.COM	MS-DOS System utility
SNMP.EXE	SNMP agent	SYSCCLASS.DLL	System Class Class installer
SNMP.INF	SNMP agent setup information	SYSDETMG.DLL	System Detection Library
SOCKET.VXD	Windows Virtual Socket network card driver	YSDEM.CPL	System Control Panel applet
SOCKETSV.VXD	PCMCIA support	SYSEDIT.EXE	System editor
SOL.CNT	Contents for Solitaire help	SYSLOGO.RLE	System logo
SOL.EXE	Solitaire game	SYSMON.CNT	Contents for System Monitor help
SOL.HLP	Solitaire help	SYSMON.EXE	System Performance Monitor
SORT.EXE	MS-DOS Sort utility	SYSMON.HLP	System Monitor help
SOUNDREC.CNT	Contents for Sound Recorder context-sensitive help	SYSTEM.DRV	Mini-Win 3 1 Standard Mode
SOUNDREC.HLP	Sound Recorder help	SYSTHUNK.DLL	Windows System Thunk Library

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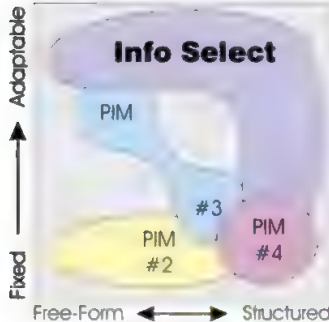
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Award winning PIM

INFO SELECT is the award winning Personal Information Manager that lets you store all your information in one organized place ... and find what you need instantly ... notes, lists, prices, ideas, and much more.

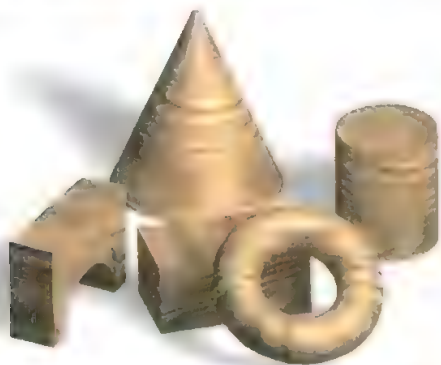
PIM Comparison Chart



INFO SELECT provides high adaptability in both free-form and structured styles - so you can work the way you want.

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INFO SELECT is like having a photographic memory that gives you perfect, superfast recall of unlimited information.



INFO SELECT is the only PIM that allows you to fully define the way you manage information by giving you powerful building blocks: NOTES, OUTLINES, CALENDARS, FORMS, and DATABASES.

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When Harry calls you on the phone, you'll have all your notes on Harry before he finishes his first sentence! No more embarrassing pauses or fumbling for information. You'll improve your relationships and be more successful.

Manages All Your Information

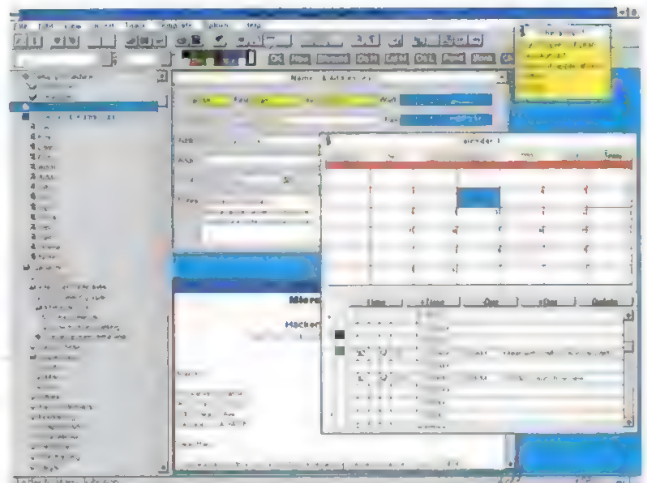
INFO SELECT can manage all your personal and business information. Use it to manage correspondence, sales leads, orders, and client notes. Track facts, plan projects, or interrelate all your ideas. You can catalog parts, documents, and inventory items. Match buyers and sellers or doctors and patients. Edit E-mail. Store Internet data or just names and addresses. Whether you are an attorney tracking court cases or a zoologist collecting feeding habits you'll find countless uses for INFO SELECT. It's like getting a dozen software packages for the price of one!

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- Click here to find something. You'll have the info you need about as fast as you can pick up a telephone.
- Click here for an instant calendar of your daily events. Enter new appointments, meetings, to-dos, and recurring events in a snap.
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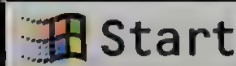
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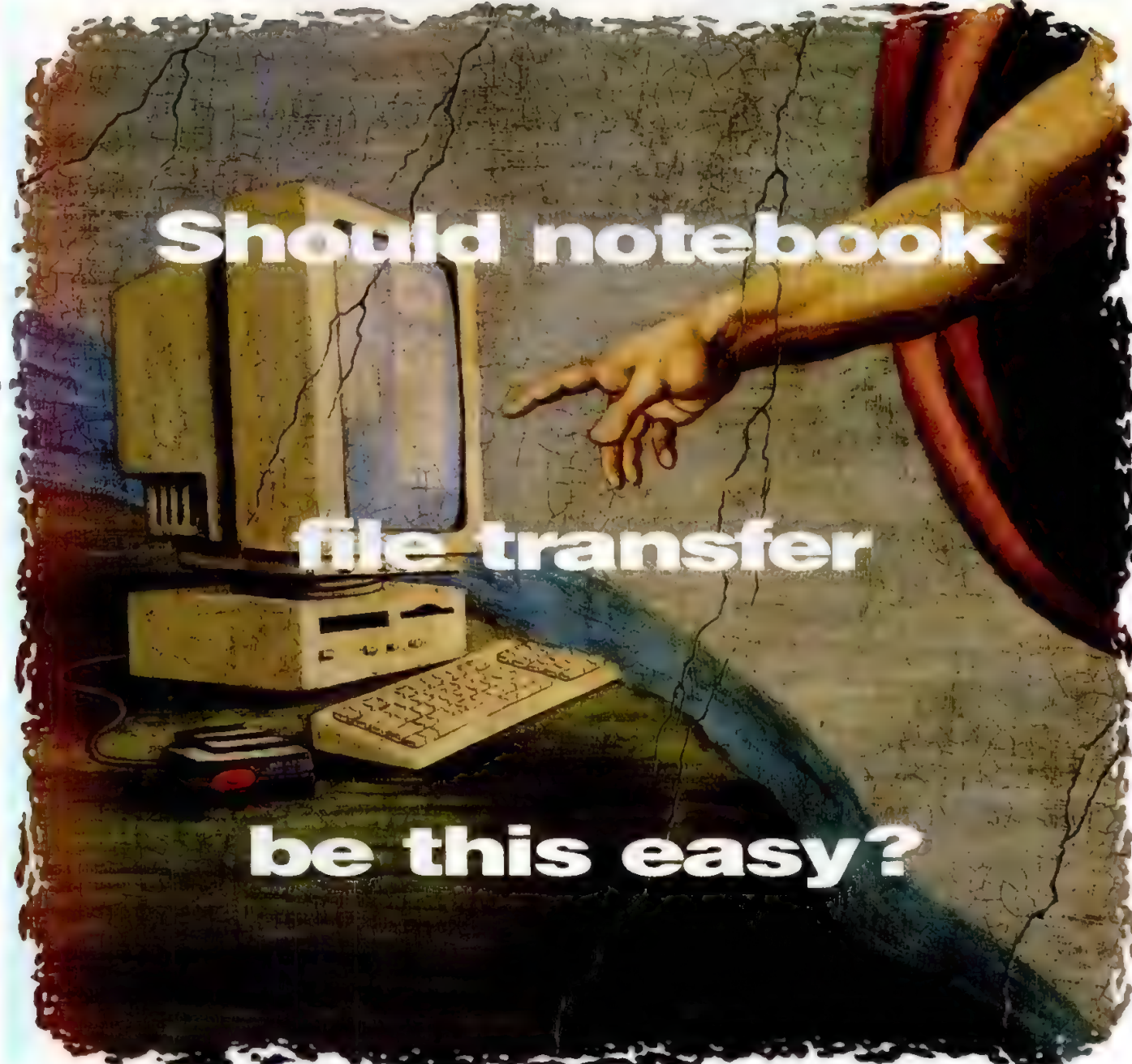
First to Span the Globe



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Windows 95 Annotated File Listing

Filename	Description	Filename	Description
PKPD.DLL	Ink support for PenWin	QIC117.VXD	Backup applet virtual device
PKPD32.DLL	32-bit ink support for PenWin	QM1700_1.SPD	Printer driver
PMSPL.DLL	LAN Manager application programming interface	QM2000_1.SPD	Printer driver
POINTER.DLL	MS Mouse support	QM825MR1.SPD	Printer driver
POINTER.EXE	MS Mouse support	QMPS4101.SPD	Printer driver
POEDIT.CNT	Contents for System Policy editor help	QMS10030.ICM	Printer profile
POEDIT.EXE	System Policy editor	QMS1725.SPD	Printer driver
POEDIT.HLP	System Policy editor help	QMS3225.SPD	Printer driver
POEDIT.INF	System Policy editor setup information	QMS420.SPD	Printer driver
POWER.DRV	Advanced Power Management driver	QMS45252.SPD	Printer driver
POWERCFG.DLL	Advanced Power Management Control Panel	QMS860.SPD	Printer driver
POWERPNT.PPT	Power Point document template	QMS8P461.SPD	Printer driver
PPM.VXD	Microcom parallel port modem driver	QMSCS210.SPD	Printer driver
PPPMAC.VXD	Windows Virtual PPP driver	QMSCS230.SPD	Printer driver
PRECOPY.INF	Information file used by setup.exe stub	QUATTRO.WB2	Quattro document template
PRESENTA.SHW	Document template	QUIETJET.DRV	Printer driver
PRINT.EXE	MS-DOS Print utility	QUICKVIEW.EXE	Quick View
PRINTERS.TXT	README file for Printers information	QWIII.DRV	Printer driver
PRO4.DOS	Network adapter driver	RAINBOW.ANI	Animated cursor
PRO4AT.DOS	Network adapter driver	RAMDRIVE.SYS	MS-DOS RAM Drive driver
PRODINV.DLL	Microsoft Network component	RASAPI16.DLL	Remote Access Services 16-bit API Library
PROGMAN.CNT	Contents for Program Manager help	RASAPI32.DLL	Remote Access Services 32-bit API Library
PROGMAN.EXE	Program Manager	RCV0000.EFX	Information about SprintFax services
PROGMAN.HLP	Program Manager help	README.TXT	README file for Windows 95
PROPRINT.DRV	Printer driver	REBOOT.VXD	REBOOT virtual device
PROPRN24.DRV	Printer driver	REDBRICK.BMP	Wallpaper bitmap
PRORAPM.DWN	Network adapter driver	REDIR32.EXE	Console App Redirection utility
PROTEON.VXD	Network adapter driver	REDIRECT.MOD	Console App Redirection utility
PROTMAN.DOS	Network adapter driver	REDTILE.BMP	Wallpaper bitmap
PROTMAN.EXE	Real-mode NDIS protocol manager	REGEDIT.CNT	Contents for RegEdit help
PRUPD.INF	Printer upgrade setup information	REGEDIT.EXE	Registry editor
PS1.DRV	Printer driver	REGEDIT.HLP	Registry editor help
PS4079.ICM	Printer profile	REGSERV.EXE	Remote registry
PSCRIPT.DRV	PostScript Printer driver	REGSRV.INF	Remote registry
PSCRIPT.HLP	PostScript printer driver help	REGWIZ.EXE	Registration wizard
PSCRIPT.INI	PostScript .INI file information	RESTORE.EXE	MS-DOS Restore utility for MS-DOS 6.x backup
PSMON.DLL	PS BiDi port monitor	RICED.DLL	Rich Edit DLL for use with WritePad
PSTRIPE.BMP	Wallpaper bitmap	RICED32.DLL	Rich Edit Control
PYRAMID2.BMP	Wallpaper bitmap	RINGIN.WAV	Audio file
Q2200_MS.SPD	Printer driver	RINGOUT.WAV	Audio file
Q2210_MS.SPD	Printer driver	RIVETS.BMP	Wallpaper bitmap
Q2220523.SPD	Printer driver	RIVETS2.BMP	Wallpaper bitmap
Q800_MS.SPD	Printer driver	RMM.PDR	RMM virtual device
Q810_MS.SPD	Printer driver	RNA.INF	Used by Setup to install Remote Network Access
Q810T_MS.SPD	Printer driver	RNAAPPEXE	Dial-up networking application
Q820_MS.SPD	Printer driver	RNAI.DLL	Network monitor agent SMS client
Q820T517.SPD	Printer driver	RNANP.DLL	Dial-Up Networking Notifier
Q860PLS2.SPD	Printer driver	RNAPLUS.INF	Setup information file for SLIP and dial-up script support
QBASIC.EXE	Microsoft QBasic interpreter	RNASERV.DLL	Remote Network Access server
QBASIC.HLP	Microsoft QBasic help	RNASETUP.DLL	Remote Network Access setup DLL
QCS1000.SPD	Printer driver	RNATHUNK.DLL	Remote Network Access Thunk Support DLL
QCS10503.SPD	Printer driver	RNAUI.DLL	Remote Network Access user interface DLL
QCS30503.SPD	Printer driver	RNDSRV32.DLL	Render server
QEMMFIX.VXD	Fix for older versions of QEMM	ROBOTZAS.WAV	Sample sound file



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Windows 95 Annotated File Listing

Filename	Description	Filename	Description
ROBOTZCL.WAV	Sample sound file	SCANPST.EXE	Personal Folders Scan
ROBOTZCR.WAV	Sample sound file	SCANPST.HLP	Personal Folders Scan help
ROBOTZDE.WAV	Sample sound file	SCCVIEW.DLL	Service DLL for Display Engines
ROBOTZER.WAV	Sample sound file	SCRNSAVE.SCR	Screen saver
ROBOTZEX.WAV	Sample sound file	SCSI.INF	SCSI setup file
ROBOTZMA.WAV	Sample sound file	SCSI1HLP.VXD	SCSI support file
ROBOTZME.WAV	Sample sound file	SCSIPOINT.PDR	SCSI port virtual device
ROBOTZMI.WAV	Sample sound file	SECUR32.DLL	Microsoft Win32 Security Services
ROBOTZOP.WAV	Sample sound file	SECURCL.DLL	Microsoft Network component
ROBOTZQU.WAV	Sample sound file	SEIKO24E.DRV	Printer driver
ROBOTZRE.WAV	Sample sound file	SEIKOSH9.DRV	Printer driver
ROBOTZWI.WAV	Sample sound file	SELECT.EXE	DEC Pathworks configuration-selection utility
ROMAN.FON	Font file	SERENUM.VXD	Serial-port enumerator
ROUTE.EXE	TCP/IP ROUTE command	SERIAL.VXD	Serial-port VCOMM driver
RPCCLTC1.DLL	Remote Procedure Call libraries	SERIALUI.DLL	Serial-port property sheet
RPCCLTC3.DLL	Remote Procedure Call libraries	SERIFE.FON	Font file
RPCCLTC5.DLL	Remote Procedure Call libraries	SERIFF.FON	Font file
RPCCLTC6.DLL	Remote Procedure Call libraries	SERVER.HLP	Server help
RPCLTS3.DLL	Remote Procedure Call libraries	SETMDIR.EXE	SBS file
RPCLTS5.DLL	Remote Procedure Call libraries	SETUP.BIN	Setup support
RPCLTS6.DLL	Remote Procedure Call libraries	SETUP.BMP	Setup Wash BitMap
RPCNS4.DLL	Remote Procedure Call libraries	SETUP.EXE	Setup program for Windows 95
RPCPP.DLL	Remote Procedure Call Print Provider	SETUP.INF	Setup information
RPCRT4.DLL	Remote Procedure Call libraries	SETUP.TXT	README file for setup
RPCSS.EXE	Remote Procedure Call Endpoint mapper	SETUP4.DLL	Setup support
RPLBOOT.SYS	Remote Program Load	SETUPPP.INF	Setup information
RPLIMAGE.DLL	Remote Program Load disk image maker	SETUPX.DLL	Setup support
RPLIMAGE.EXE	Remote Program Load disk image maker	SETUPX.DLL	Setup services/extensions DLL
RSRC16.DLL	Resource Meter	SETVER.EXE	MS-DOS SetVer utility
RSRC32.DLL	Resource Meter	SF4029.EXE	Printer driver
RSRCMTR.EXE	Resource Meter	SHARE.EXE	MS-DOS Share utility
RSRCMTR.INF	Resource Meter	SHELL.DLL	Win 3.1 Shell DLL used by setup
RUMOR.EXE	DDE test/game	SHELL.INF	Shell setup information
RUNDLL.EXE	Runs a DLL as an application	SHELL.NEW	Win 4.0 Shell DLL
RUNDLL32.EXE	32-bit Shell component	SHELL.VXD	Shell virtual device
RUNONCE.EXE	RunOnce wrapper for setup	SHELL2.INF	Color schemes
S3.DRV	S3 display driver	SHELL3.INF	Cursor schemes
S3.VXD	S3 virtual device	SHELL32.DLL	Windows Shell Common DLL
SACLIENT.DLL	Microsoft Network component	SHSCRAP.DLL	Shell Scrap and Docshortcut viewer
SAMPLE.VIDEOS	Sample video file	SIGNUP.EXE	Sign-up application for Microsoft Network component
SAND.BMP	Wallpaper bitmap	SIZE1_1.CUR	Cursor
SAPNSP.DLL	Winsock data-link library	SIZE1_2.CUR	Cursor
SAVE32.COM	TSR used by setup	SIZE1_3.CUR	Cursor
SB16.VXD	Sound Blaster 16 virtual device	SIZE1_4.CUR	Cursor
SB16SND.DRV	Sound Blaster 16 Driver	SIZE1_5.CUR	Cursor
SBAWE.VXD	Sound Blaster AWE virtual device	SIZE1_L.CUR	Cursor
SBAWE32.DRV	Sound Blaster AWE Driver	SIZE1_M.CUR	Cursor
SBFM.DRV	Sound Blaster 16 Driver	SIZE2_1.CUR	Cursor
SCANDISK.BAT	Replacement stub for MS-DOS 6.x Scandisk	SIZE2_2.CUR	Cursor
SCANDISK.EXE	Disk diagnostic tool	SIZE2_3.CUR	Cursor
SCANDISK.INI	Disk diagnostic tool	SIZE2_4.CUR	Cursor
SCANDISK.PIF	PIF to launch Scandisk from setup	SIZE2_5.CUR	Cursor
SCANDSKW.EXE	Disk-repair tool	SIZE2_L.CUR	Cursor
SCANPROG.EXE	Stub to launch Scandisk during setup	SIZE2_M.CUR	Cursor

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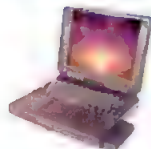
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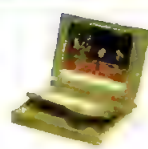
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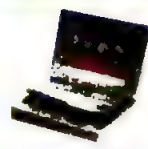
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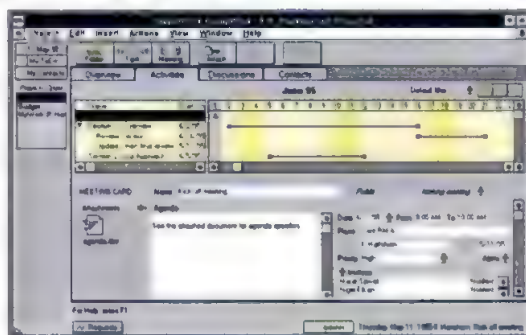
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Windows 95 Annotated File Listing

Filename	Description	Filename	Description
SIZE3_1.CUR	Cursor	SPAP.VXD	Shiva PAP virtual driver
SIZE3_2.CUR	Cursor	SPARROW.MPD	SCSI driver
SIZE3_3.CUR	Cursor	SPARROWX.MPD	SCSI driver
SIZE3_4.CUR	Cursor	SPLITTER.VXD	NetBIOS gateway group name-splitter
SIZE3_5.CUR	Cursor	SPOCK.MPD	SCSI driver
SIZE3_L.CUR	Cursor	SP00L32.EXE	Printer support
SIZE3_M.CUR	Cursor	SPOOLER.VXD	Print-sharing virtual device
SIZE4_1.CUR	Cursor	SPOOLSS.DLL	Spooler Sub System DLL
SIZE4_2.CUR	Cursor	SQUARES.BMP	Wallpaper bitmap
SIZE4_3.CUR	Cursor	SRAMMTD.VXD	PCMCIA support
SIZE4_4.CUR	Cursor	SSERIFE.FON	Font file
SIZE4_5.CUR	Cursor	SSERIFF.FON	Font file
SIZE4_L.CUR	Cursor	SSFLYWIN.SCR	Screen saver
SIZE4_M.CUR	Cursor	SSMARQUE.SCR	Screen saver
SIZENESW.ANI	Animated cursor	SSMYST.SCR	Screen saver
SIZENS.ANI	Animated cursor	SSSTARS.SCR	Screen saver
SIZENWSE.ANI	Animated cursor	STAR24E.DRV	Printer driver
SIZEWE.ANI	Animated cursor	STAR9E.DRV	Printer driver
SKPSFA_1.SPD	Printer driver	START.EXE	Program Starter
SLAN.DOS	Network adapter driver	STATE.PBK	Microsoft Network component
SLCD32.MPD	SCSI driver	STDOLE.TLB	OLE 2.0 file
SLENH.DLL	Advanced power management options	STDOLE32.TLB	OLE 2-32 file
SMALLE.FON	Font file	STEM0409.DLL	DLL used for Windows 95 help
SMALLF.FON	Font file	STLS04SS.SPD	Printer driver
SMARTDRV.EXE	MS-DOS startup utility	STLS08LP.SPD	Printer driver
SMARTND.DOS	Network adapter driver	STLS5TTU.SPD	Printer driver
SMC_ARC.DOS	Network adapter driver	STORAGE.DLL	OLE Storage Management Library
SMC3000.DOS	Network adapter driver	STRN.DOS	Network adapter driver
SMC8000.DOS	Network adapter driver	SUBST.EXE	MS-DOS Subst utility
SMC8000W.VXD	Network adapter driver	SUEXPAND.DLL	Setup LZ DLL
SMC80PC.VXD	Network adapter driver	SUFILBAT	SmartRecovery warning
SMC8100.DOS	Network adapter driver	SUHELPER.BIN	Setup support
SMC8100W.VXD	Network adapter driver	SUPERVGA.DRV	Super VGA display driver
SMC8232.DOS	Network adapter driver	SUPPORT.TXT	PSS support info
SMC8232W.VXD	Network adapter driver	SVCPROP.DLL	Microsoft Network component
SMC9000.DOS	Network adapter driver	SVRAPI.DLL	32-bit Common Server API Library
SMC9000.VXD	Network adapter driver	SXCIEXT.DLL	Matrox display driver support file
SNAPSHOT.EXE	Snapshot	SYMBOL.TTF	Symbol font
SNAPSHOT.VXD	Snapshot virtual device	SYMBOLE.FON	Font file
SNDREC32.EXE	Sound recorder	SYMBOLF.FON	Font file
SNDVOL32.CNT	Contents for Mixer Controls context-sensitive help	SYNCENG.DLL	32-bit file sync engine
SNDVOL32.EXE	Mixer Controls	SYNCUI.DLL	Briefcase DLL
SNDVOL32.HLP	Mixer Controls help	SYNTHGM.SBK	Sound Blaster AWE general MIDI wavetable
SNIP.VXD	Network adapter driver	SYS.COM	MS-DOS System utility
SNMP.EXE	SNMP agent	SYSCCLASS.DLL	System Class Class installer
SNMP.INF	SNMP agent setup information	SYSDETMG.DLL	System Detection Library
SOCKET.VXD	Windows Virtual Socket network card driver	SYSDM.CPL	System Control Panel applet
SOCKETSV.VXD	PCMCIA support	SYSEDTX.EXE	System editor
SOL.CNT	Contents for Solitaire help	SYSLOGO.RLE	System logo
SOLEXE	Solitaire game	SYSMON.CNT	Contents for System Monitor help
SOL.HLP	Solitaire help	SYSMON.EXE	System Performance Monitor
SORT.EXE	MS-DOS Sort utility	SYSMON.HLP	System Monitor help
SOUNDREC.CNT	Contents for Sound Recorder context-sensitive help	SYSTEM.DRV	Mini-Win 3.1 Standard Mode
SOUNDREC.HLP	Sound Recorder help	SYSTHUNK.DLL	Windows System Thunk Library

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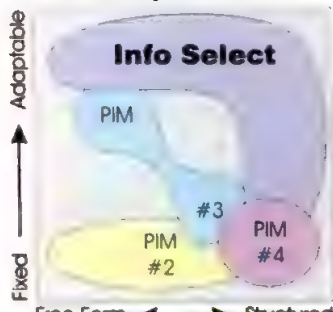
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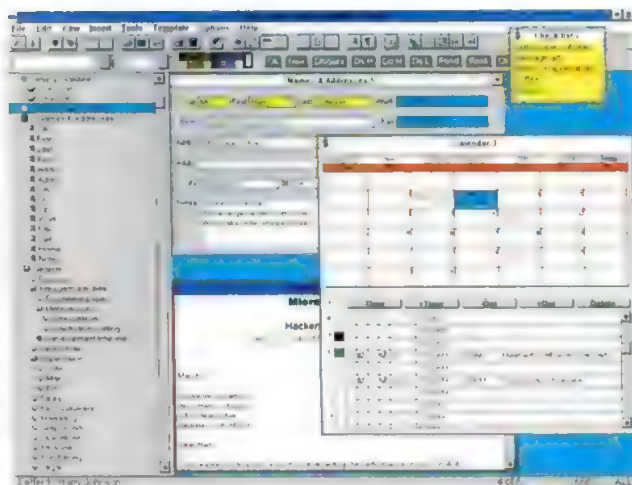
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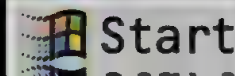
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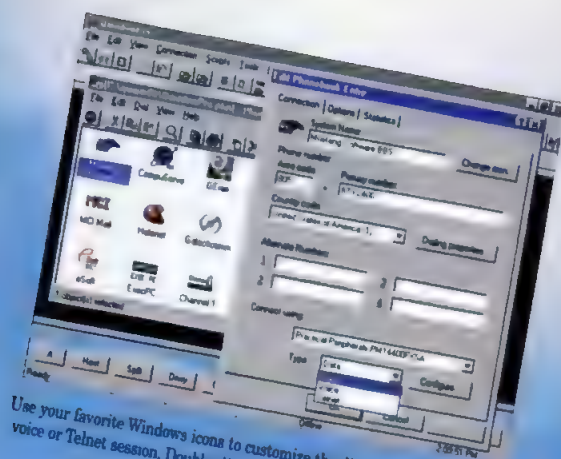
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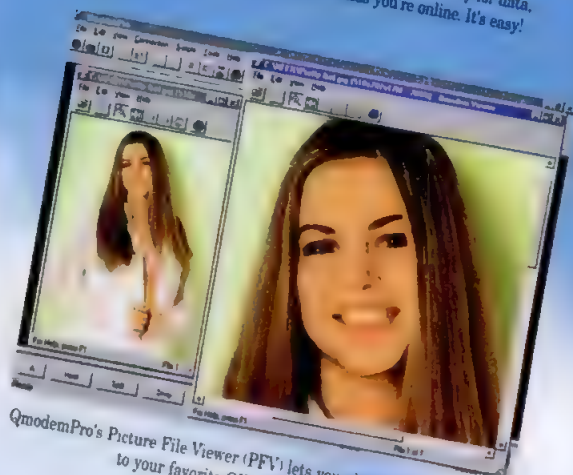


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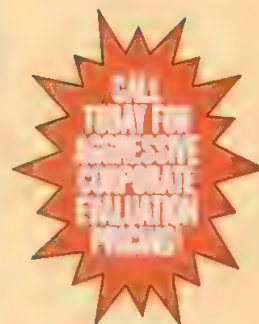
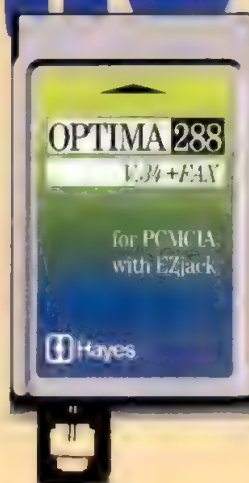
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Windows 95 Annotated File Listing

Filename	Description	Filename	Description
SYSTRAY.EXE	Advanced Power Management and PCMCIA tray application	TLNK3.VXD	Network adapter driver
T128.MPD	SCSI driver	TMV1.MPD	SCSI driver
T13B.MPD	SCSI driver	TOOLHELP.DLL	16-bit developer helper
T160.MPD	SCSI driver	TOSHIBA.DRV	Printer driver
T20N3.VXD	Network adapter driver	TOUR.EXE	Tour files
T20ND.DOS	Network adapter driver	TOURANI.DLL	Tour files
T30N3.VXD	Network adapter driver	TOURSTR.DLL	Tour files
T30ND.DOS	Network adapter driver	TOURUTIL.DLL	Tour files
T338.MPD	SCSI driver	TPHA2001.ICM	Printer profile
T348.MPD	SCSI driver	TPHAIII.ICM	Printer profile
T358.MPD	SCSI driver	TRACERT.EXE	TCP/IP TRACEROUTE command
TADA.WAV	Sample wave file	TREE.COM	MS-DOS Tree utility
TAPI.DLL	Telephony API	TREEEDCL.DLL	Microsoft Network component
TAPI.INF	Telephony API setup information file	TREENVCL.DLL	Microsoft Network component
TAPI32.DLL	32-bit thanks to TAPI.DLL	TRIUMPH1.SPD	Printer driver
TAPIADDR.DLL	Telephony API	TRIUMPH2.SPD	Printer driver
TAPIEXE.EXE	Telephony API component	TSD32.DLL	Audio Compression Manager
TAPIINI.EXE	Telephony API component	TSENG.DRV	Tseng ET4000 W32 display driver
TASKMAN.EXE	Task manager	TSENG.VXD	Tseng minivdd
TCCARC.DOS	Network adapter driver	TSSOFT32.ACM	Audio Compression Manager codec
TCCTOK.DOS	Network adapter driver	TTY.DRV	Printer driver
TCTOKCH.VXD	Network adapter driver	TTY.HLP	TTY printer driver help
TELEPHON.CPL	Telephony Control Panel applet	TYPELIB.DLL	OLE 2.0
TELEPHON.HLP	Telephony help	U9415470.SPD	Printer driver
TELNET.EXE	Telnet application	UBNE1.DOS	Network adapter driver
TELNET.HLP	Telnet help	UBNE1.VXD	Network adapter driver
TESTPS.TXT	PostScript test	UBNEPS.DOS	Network adapter driver
TEXTCHAT.EXE	Microsoft Network component	ULTRA124.MPD	SCSI driver
THATCH.BMP	Wallpaper bitmap	ULTRA14F.MPD	SCSI driver
THATCH2.BMP	Wallpaper bitmap	ULTRA24F.MPD	SCSI driver
THEMIC-1.WAV	Sample audio file	UMDM16.DLL	Universal Modem Driver component
THINKJET.DRV	Printer driver	UMDM32.DLL	Universal Modem Driver component
THREED.VBX	Windows 95 Tour	UNICODE.BIN	Unicode mapping tables
T1850.DRV	Printer driver	UNICODE.NLS	Unicode mapping tables
TIM17521.SPD	Printer driver	UNIDRV.DLL	Microsoft Universal Printer Driver library
TIM35521.SPD	Printer driver	UNIDRV.HLP	Help for Universal Printer Driver
TIMEDATE.CPL	Time/date Control Panel	UNIMDM.TSP	Unimodem TAPI service provider
TIMES.TTF	Times font	UNIMODEM.VXD	Universal Modem Driver
TIMESBD.TTF	Times Bold font	UP_1.CUR	Cursor
TIMESBI.TTF	Times Bold Italic font	UP_2.CUR	Cursor
TIMESI.TTF	Times Italic font	UP_3.CUR	Cursor
TIMEZONE.INF	Setup information	UP_4.CUR	Cursor
TIMLP232.SPD	Printer driver	UP_5.CUR	Cursor
TK200172.SPD	Printer driver	UP_L.CUR	Cursor
TK220171.SPD	Printer driver	UP_M.CUR	Cursor
TKP20012.SPD	Print driver	URGENT.CPE	Fax cover page that reads "Urgent!"
TKP22011.SPD	Printer driver	USER.EXE	Mini Win 3.1 User.Exe for use by setup
TKP2SDX1.SPD	Printer driver	USER32.DLL	32-bit user
TKP30011.SPD	Printer driver	UTOPIA-1.WAV	Sample audio file
TKPH4801.SPD	Printer driver	UTOPIA-2.WAV	Sample audio file
TKPHZR22.SPD	Printer driver	UTOPIA-3.WAV	Sample audio file
TKPHZR32.SPD	Printer driver	UTOPIA-4.WAV	Sample audio file
TLNK.DOS	Network adapter driver	UTOPIAAS.WAV	Sample audio file
TLNK3.DOS	Network adapter driver	UTOPIACL.WAV	Sample audio file

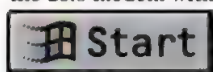
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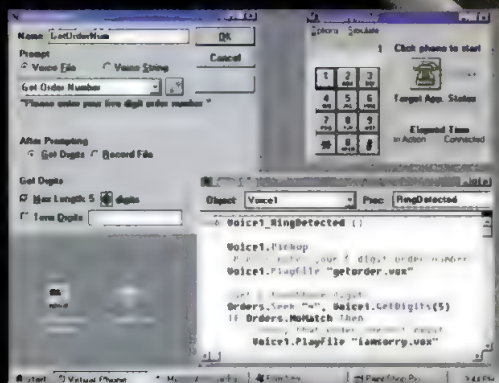
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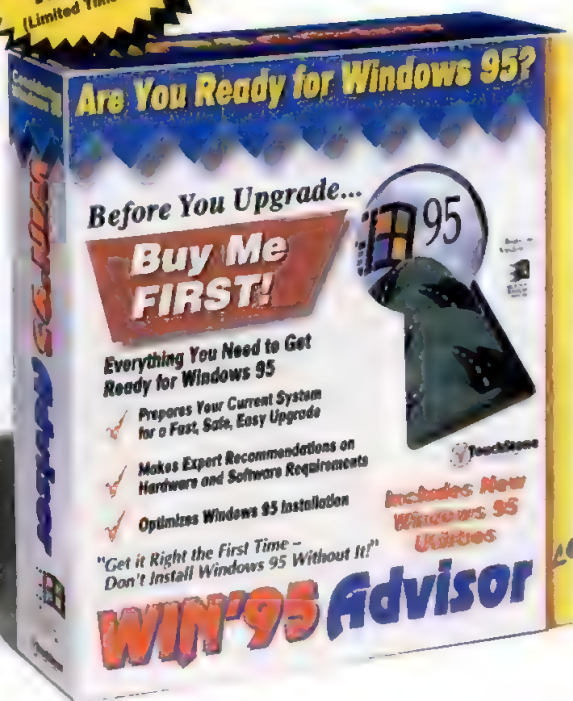
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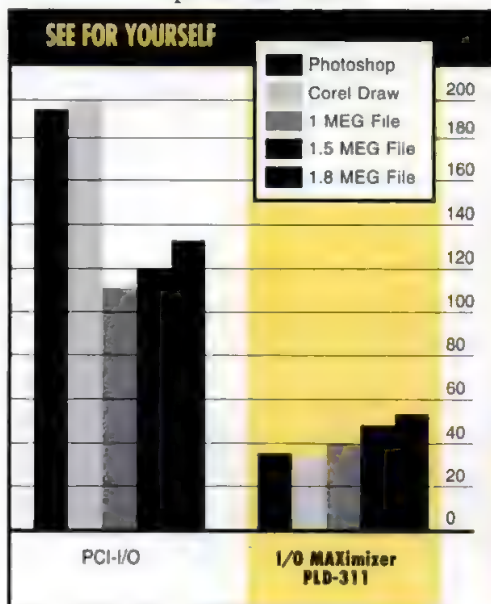
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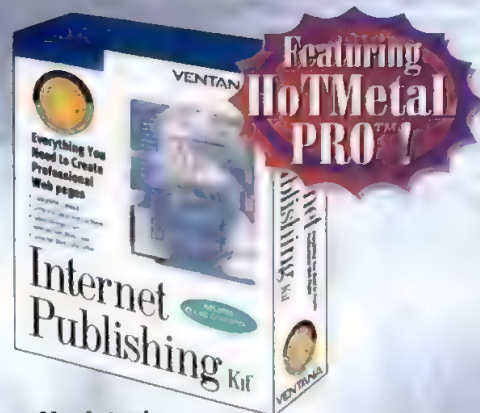
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Windows 95 Annotated File Listing

Filename	Description	Filename	Description
UTOPIACR.WAV	Sample audio file	VMVID.VXD	MediaVision ProAudio 3D device
UTOPIADE.WAV	Sample audio file	VNBT.386	NetBIOS transport driver for TCP/IP
UTOPIAER.WAV	Sample audio file	VNETBIOS.VXD	VNETBIOS virtual device
UTOPIAEX.WAV	Sample audio file	VNETSUP.VXD	Network support virtual device
UTOPIAMA.WAV	Sample audio file	VOLTRACK.VXD	Volume tracker virtual device
UTOPIAME.WAV	Sample audio file	VPASD.VXD	MediaVision ProAudio Spectrum device
UTOPIAMI.WAV	Sample audio file	VPD.VXD	Virtual LPT driver
UTOPIAOP.WAV	Sample audio file	VPICD.VXD	Virtual Programmable Interrupt Controller device
UTOPIAQU.WAV	Sample audio file	VPMTD.386	VPMTD virtual device
UTOPIARE.WAV	Sample audio file	VPOWERD.VXD	Advanced power management virtual device
UTOPIAWI.WAV	Sample audio file	VREDIR.VXD	32-bit client for Microsoft Networks
V86MMGR.VXD	V86MMGR virtual device	VSAMI.DLL	AMI file parser
VAMPIRE.AVI	Sample video file	VSASC8.DLL	ASCII file parser
VBRUN300.DLL	Tour files	VSAMP.DLL	BMP file parser
VCACHE.VXD	VCache virtual device	VSD.VXD	VSD virtual device
VCD.VXD	Virtual COM driver	VSDRW.DLL	Micrografx Draw file parser
VCDFS.D.VXD	VCDFS.D virtual device	VSERVER.VXD	32-bit server for Microsoft Networks
VCOMM.VXD	VCOMM driver	VSEXE2.DLL	EXE/DLL viewer
VCOND.VXD	Win-32 console	VSFLW.DLL	Freelance for Windows file parser
VDD.VXD	Main VDD	VSGIF.DLL	GIF file parser
VDEF.VXD	VDEF virtual device	VSHARE.VXD	32-bit Share virtual device driver
VDHCP.386	DHCP virtual device for TCP/IP	VSMP.DLL	Multiplan file parser
VDMAD.VXD	VDMAD virtual device	VSMSW.DLL	Win Write file parser
VER.DLL	Setup Mini Win 3.1 16-bit versioning DLL	VSPP.DLL	PowerPoint parser
VER.DLL	Setup Mini Win 3.1 16-bit versioning DLL	VSQPW2.DLL	Chart for Quattro Pro for Windows
VER.NEW	Version checking and file-installation libraries	VSRTF.DLL	RTF file parser
VERSION.DLL	32-bit versioning DLL	VSTIFF.DLL	TIFF file parser
VERX.DLL	Version DLL for use by setup	VSW6.DLL	Word 6 file parser
VFAT.VXD	VFAT file system	VSWK3.DLL	1-2-3 file parser
VFBACKUP.VXD	VFBACKUP virtual device	VSWK4.DLL	1-2-3 file parser
VFD.VXD	Floppy disk virtual device	VSWKS.DLL	1-2-3 file parser
VFLATD.VXD	Virtual flat-frame buffer virtual device	VSWMF.DLL	Metafile file parser
VGA.DRV	VGA display driver	VSWORD.DLL	Word file parser
VGA.DRV	Win 3.1 VGA display driver for Setup Mini Win 3.1	VSWORK.DLL	Works file parser
VGA850.FON	Font file	VSWP5.DLL	WordPerfect 5 file parser
VGAFIX.FON	Font file	VSWP6.DLL	WordPerfect 6 file parser
VGAFIX.FON	Font file	VSWPF.DLL	WordPerfect 4.2 file parser
VGAFULL3GR	Combined VGA/DIB 386 enhanced-mode display component	VSXL5.DLL	Excel 385 file/chart parser
VGAOEM.FON	Font file	VT600480.SPD	Printer driver
VGAOEM.FON	Font file	VTCP.386	Virtual TCP driver for TCP/IP
VGASYS.FON	Font file	VTD.VXD	VTD virtual device
VGASYS.FON	Font file	VTDAP1.VXD	VTDAP1 virtual device
VIDCAP.INF	Plug and Play VCD information	VTDI.386	Support for the Transport driver interface
VIDEO7.VXD	Video Seven virtual device	VUDP.386	Support for User Datagram protocol
VIP.386	Virtual IP device for TCP/IP	VWIN32.VXD	Ring-0 32-bit API support
VJOYD.VXD	Joystick virtual device	VXDLD.R.VXD	Virtual device driver loader
VKD.VXD	Virtual keyboard device	W_OVER.CNT	Contents for Windows 95 Tour help
VLB32.DLL	Mail/Exchange component	W_TOUR.CNT	Contents for Windows 95 Tour help
VMCPD.VXD	VMCPD virtual device	WAIT_1.CUR	Cursor
VMD.VXD	Win3.1 virtual mouse driver	WAIT_2.CUR	Cursor
VMM.VXD	Virtual memory manager device	WAIT_3.CUR	Cursor
VMM32.VXD	Virtual memory manager device	WAIT_4.CUR	Cursor
VMOUSE.VXD	Virtual mouse driver	WAIT_5.CUR	Cursor
VMPOLL.VXD	VMPOLL virtual device	WAIT_L.CUR	Cursor

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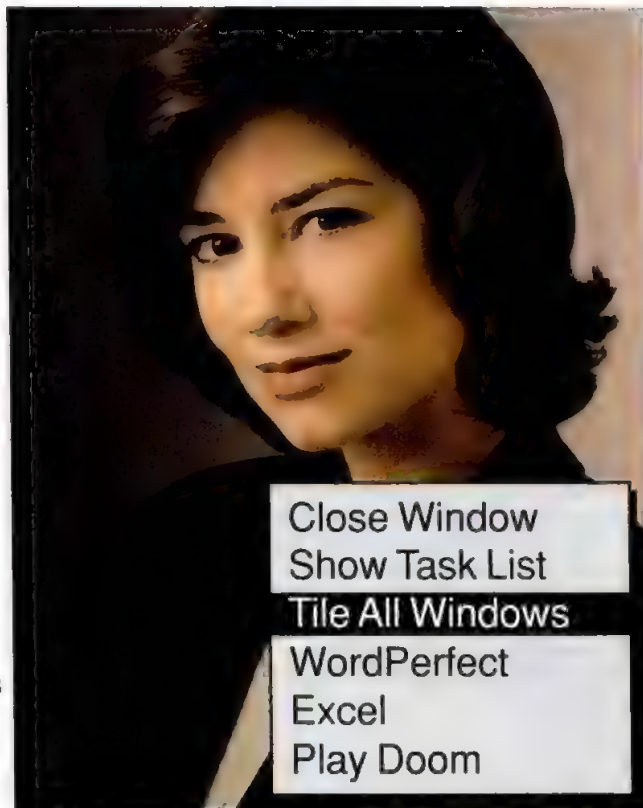
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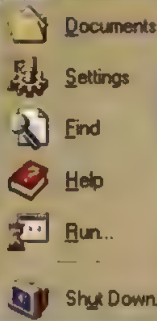
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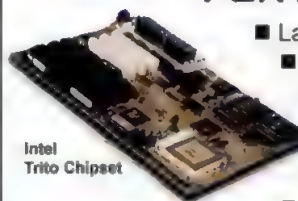


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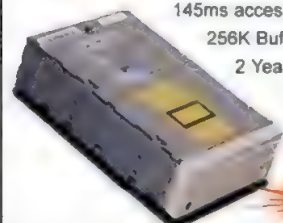
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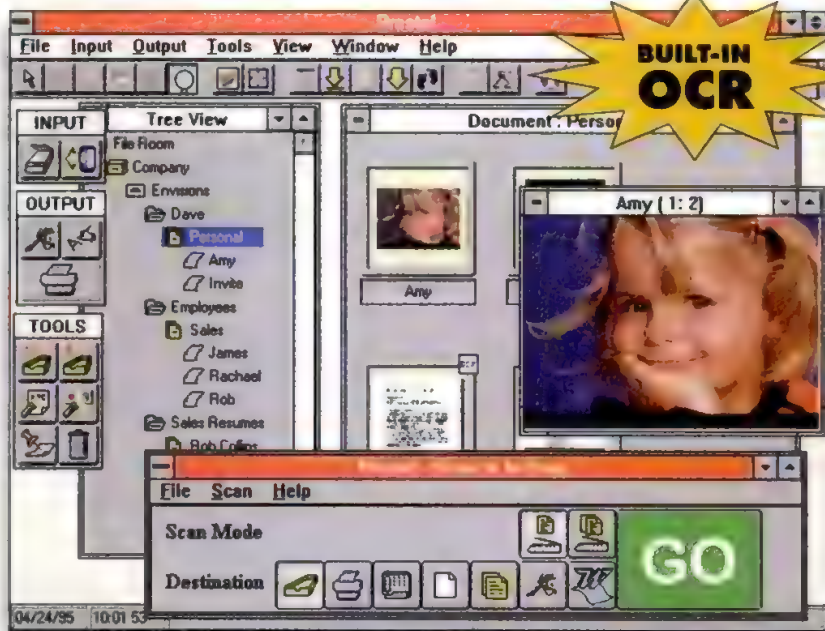
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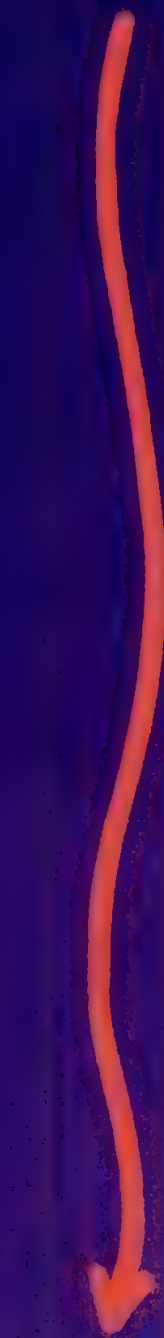
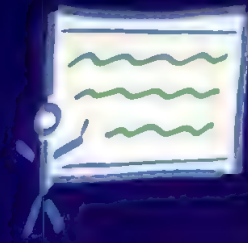
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Windows 95 Annotated File Listing

Filename	Description	Filename	Description
WAIT_M.CUR	Cursor	WINSOCK.DLL	Socket API for Windows
WAVE.INF	Plug and Play Wave Device information	WINSPL16.DRV	Printer driver
WD.DRV	Western Digital display driver	WINVER.40	Windows Version utility
WD.VXD	Western Digital virtual device	WINVER.CDA	Windows Version utility
WD7000EX.MPD	SCSI driver	WINVER.EXE	Windows Version utility
WEAVE2.BMP	Wallpaper bitmap	WINVER.INF	Windows Version utility setup information
WELCOME.EXE	Welcome application	WINVER.MAP	Windows Version utility
WELCOME.SHG	Microsoft Network component	WINVER.OCF	Windows Version utility
WFM0200.ACX	Sound Blaster AWE codec	WINVER.OCU	Windows Version utility
WFM0200A.CSP	Sound Blaster AWE codec	WINVER.OCX	Windows Version utility
WFM0201.ACX	Sound Blaster AWE codec	WINVER.ODF	Windows Version utility
WFM0201A.CSP	Sound Blaster AWE codec	WINVER.OFF	Windows Version utility
WFM0202.ACX	Sound Blaster AWE codec	WINVER.OFU	Windows Version utility
WFM0202A.CSP	Sound Blaster AWE codec	WINVER.OUX	Windows Version utility
WFM0203.ACX	Sound Blaster AWE codec	WINVER.RCU	Windows Version utility
WFM0203A.CSP	Sound Blaster AWE codec	WINVER.RFF	Windows Version utility
WGPOADMN.DLL	Mail/Exchange component	WINVER.RFU	Windows Version utility
WGPOCPLCPL	Mail/Exchange component	WINVER.RNU	Windows Version utility
WHLP16T.DLL	Help DLL	WINVER.SYM	Windows Version utility
WHLP32T.DLL	Help DLL	WINWORD.DOC	Word document template
WIN.INI	For Miniwin 3.1 setup	WINWORD2.DOC	Word document template
WIN32S16.DLL	Base file for application compatibility	WMSFR32.DLL	Mail/Exchange component
WIN87EM.DLL	80387 math-emulation libraries	WMSUI32.DLL	Mail/Exchange component
WIN95BB.DLL	Windows 95 Setup BillBrd DLL	WNASPI32.DLL	32-bit ASPI for Windows DLL
WINASPI.DLL	ASPI for Windows DLL	WNPP32.DLL	Print Provider for Old WinNet drivers
WINCHAT.CNT	Contents for Chat help	WORDPAD.CNT	Contents for WordPad help
WINCHAT.EXE	Chat applet	WORDPAD.EXE	WritePad Applet
WINCHAT.HLP	Chat help	WORDPAD.HLP	Wordpad help
WINDOWS.CNT	Contents for Windows 95 help	WORDPAD.INF	WritePad Setup
WINDOWS.HLP	Windows 95 help	WORDPFCT.WPD	Word document template
WINFILE.CNT	Contents for File Manager help	WORDPFCT.WPG	Word document template
WINFILE.EXE	Windows for Workgroups File Manager	WORDPFCT.WPW	Word document template
WINFILE.HLP	File Manager help	WPS_UPDT.DLL	Updates for existing Workplace Shell drivers
WINFLAG.ANI	Animated cursor	WPSAPD.DLL	Windows Printing System APD Library
WINGDING.TTF	Wingdings font	WPSMON.DLL	WPS Monitor DLL
WINHELP.EXE	Windows Help launcher	WPSMON16.DLL	WPS Monitor Thunk DLL
WINHLP32.CNT	Contents for WinHlp32 help	WPSUNI.DRV	Fax driver
WINHLP32.EXE	Windows help	WPSUNIRE.DLL	WPS Host Resource Executor
WINHLP32.HLP	Windows help	WRITE.EXE	Stub for Windows Write applet
WININIT.EXE	Windows initialization	WRITE32.WPC	Write converter
WINIPCFG.EXE	TCP/IP Configuration utility	WSASRV.EXE	Windows Sockets Asynchronous Request Server
WINLOGO.BMP	Wallpaper bitmap	WSHTCP.VXD	Windows Sockets TCP helper driver
WINMINE.CNT	Contents for Minesweeper help	WSIPX.VXD	Windows Sockets IPX driver
WINMINE.EXE	Minesweeper game	WSOCK.VXD	Windows Sockets virtual device driver
WINMINE.HLP	Minesweeper game help	WSOCK32.DLL	32-bit Socket API for Windows
WINMM.DLL	Multimedia Thunks	WSTCP.VXD	Windows Sockets TCP driver
WINNET16.DLL	Multinet Router Helper for 16-bit WinNet drivers	WSVV.VXD	Windows Sockets ViewView driver
WINNEWS.TXT	WinNews information	XCOPY.EXE	MS-DOS Xcopy utility
WINPOPUP.CNT	Contents for Popup utility help	XCOPY32.EXE	File Copy program
WINPOPUP.EXE	Popup utility	XGA.DRV	XGA display driver
WINPOPUP.HLP	Popup utility help	XGA.VXD	XGA mini virtual device
WINPOPUP.INF	Popup utility setup information	XLAT850.BIN	Converts between codepage 850 and 1252
WINREG.DLL	Remote registry support	XMSMMGR.EXE	Himem TSR
WINSETUP.BIN	Setup stub for setup from Windows	ZIGZAG.BMP	Wallpaper bitmap



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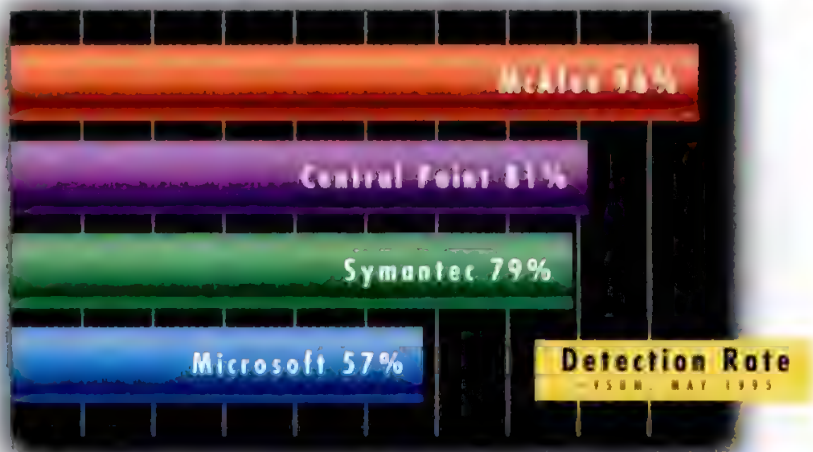
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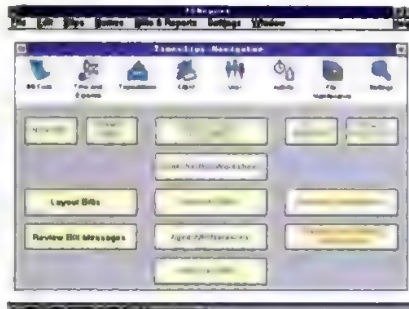
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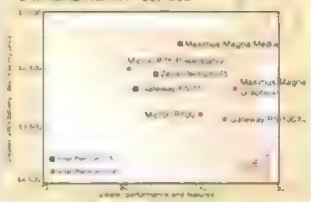
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By Gabrielle Gagnon

Exploring IBM's SOM, Part 1

OS/2's Workplace Shell rests on the powerful System Object Model.



Object-oriented technology promises a host of advantages to end users as well as to programmers, not the least of which is the ability to construct applications from reusable components. If you're new to OS/2, you may not know that the Workplace Shell (WPS) is an object-oriented user interface (OOUI) and that all of its objects—folders, notebooks, printers, templates, and so forth—are reusable components available for you to customize and integrate into your own applications.

The Workplace Shell is based on IBM's System Object Model (SOM), a technology designed to solve the problems of tight coupling and language dependence. Workplace Shell objects operate in the SOM runtime environment, which is accessible to almost any language that can call external procedures, including REXX. While you can't create or subclass a WPS class with REXX—you need a separate SOM compiler for that—you can create, destroy, and do pretty much anything else you want with WPS objects using REXX. This can be very handy if you're a system administrator who must configure a number of workstations.

In this issue we'll discuss the technology underlying SOM and examine how it relates to the Workplace Shell. In our next installment, we'll explore how to work with WPS objects using REXX.

WHAT IS SOM?

SOM is a language-independent, object-oriented technology for building, packaging, and manipulating binary class libraries. The operative words here are *binary* and *language-independent*. Although many people think of OS/2 as an older technology, SOM is actually one of the most interesting new developments in the industry today. Object-oriented programming (OOP) has been steadily

gaining acceptance as the programming paradigm of choice, but its use in commercial software has been hampered by the inability of OOP languages to use class libraries written in other languages and the need to distribute source code with the class libraries. (Most third-party vendors of class libraries have to sell you the source code, because different compilers have different ways of mapping objects.)

As we'll see, SOM eliminates these restrictions as well as those imposed by the tight binary coupling between an object and its clients that has plagued static binding OOP languages like C++ where messages and methods are bound at compile-time rather than at runtime. And SOM isn't just of interest to OS/2 developers, either. The SOM runtime environment currently ships with IBM's AIX operating system as well as OS/2, and a version

for Windows is available separately. And the compound-document architecture Apple uses, OpenDoc, is based on SOM. SOM's real potential lies in its ability to interoperate with almost any platform or language. SOM complies with the Common Object Request Broker Architecture (CORBA) specification, which defines a standard for interoperability between applications and objects in a heterogeneous network.

CORBA was developed by the Object Management Group (OMG), a consortium of more than 300 software and hardware vendors and end-user companies. Its members include all the major players in the computer industry, so it has considerable support. Even Microsoft is a member, though its participation is questionable since it is developing its own standard, the Component Object Model (COM), which will eventually compete with CORBA.

CORBA is part of a broader standard for distributed processing called the Object Management Architecture (OMA). CORBA specifies the architecture of an Object Request Broker (ORB), which handles the interaction between objects and applications. Through ORBs, requests can be made between processes on a single machine or between machines across a network. DSOM (Distributed SOM), the distributed object SOM framework included with IBM's SOMObjects Developer Toolkit, is an implementation of a CORBA ORB.

What all of this means is that SOM, or more specifically DSOM, is a viable distributed object technology and part of an industrywide trend toward cooperative computing. Many regard CORBA as the only truly workable cross-platform, cross-operating system standard, and SOM is a very real implementation of it that you can use today.

HOW SOM WORKS

SOM is a class-based object model that provides a mechanism for sharing class libraries among different languages and for decoupling a

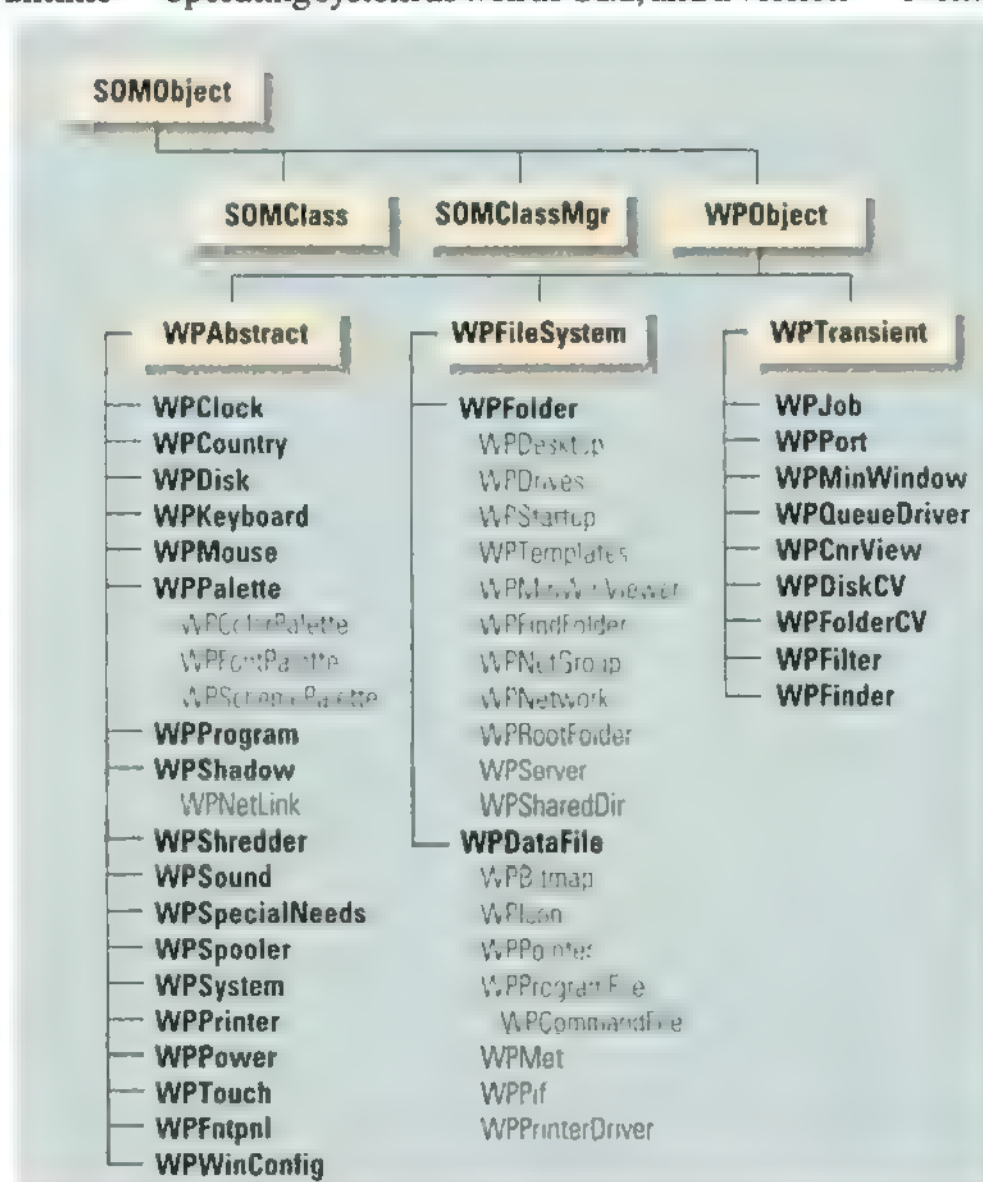


FIGURE 1: At the top of the SOM object hierarchy is SOMObject, the root of all SOM classes. All classes, including WPS classes, derive their properties and behavior directly or indirectly from SOMObject.

class's implementation from the client programs that use it. It is not a full-blown object-oriented language, but it supports the object-oriented principles of encapsulation, inheritance, and polymorphism.

In SOM, classes are "templates" for objects that define their potential attributes and behavior; objects are specific instances of classes. Unlike C++ classes, however, SOM classes are also objects and, as such, they are similar to classes in "pure" object-oriented languages like Smalltalk. While C++ classes are compile-time structures that disappear at runtime, SOM classes exist as class objects at runtime. Since all SOM objects must be instances of SOM classes, SOM uses metaclasses to instantiate classes. (Metaclasses are templates for classes in the same way that classes are templates for objects.) One of the advantages to having SOM classes exist as class objects is that information about classes can be obtained and updated dynamically at runtime.

SOM enables the sharing of class libraries by providing an intermediary layer between objects and their clients. SOM classes, or more precisely the interfaces to SOM classes, are created using the CORBA-based Interface Definition Language (IDL). CORBA's IDL is a C-like language designed expressly for defining language-independent class interfaces. Using an IDL allows an object's interface to be separated from its implementation. That way the user of a class and the implementor of a class don't have to use the same language. Once a SOM class is defined, the SOM compiler takes the IDL code and generates the appropriate bindings for the implementation code and headers for client files. (DirectToSOM compilers that bypass the step of writing and compiling IDL code are now available, but the end result is the same.) Right now, IBM supplies bindings for classes implemented in C and C++, and it eventually plans to release bindings for Smalltalk, OORexx, and COBOL. Third-party bindings are also available. If you want to write your own bindings, IBM supplies an Emitter framework for that purpose with its SOMObjects Developer Toolkit.

The important point here is that with SOM, objects and their clients are bound not to each other but to the SOM interface. That means that as long as an object's interface remains the same, the underlying implementation can change without affecting its clients. This mechanism overcomes the limitations inherent in static binding languages like C++ or Object Pascal. In C++, classes and their clients are tightly coupled (that is, compiled client code contains constants whose values depend on the organization of the classes they use). As a result, you can't modify classes without recompiling all of their clients too. This isn't a problem for dy-

namic binding languages like Smalltalk or Objective C, but for C++ it can be a distribution nightmare. It means that if you change a base class by adding a virtual function, for example, you have to recompile not only the clients of the class you changed, but all the clients of classes derived from that class. (This may be one of the main reasons C++ hasn't taken over the world.) Since SOM decouples a class from its clients, it effectively allows C++ to bind to objects dynamically the way Smalltalk does.

Another notable feature of SOM is that it supports interface inheritance: SOM subclasses inherit all the methods defined in the interfaces to their parent classes, even if they are

SOM provides an
intermediary layer
between objects and their
clients. The user and the
implementor of a class
don't have to use the same
language.

implemented in different languages.

SOM also supports multiple inheritance (the ability to derive a subclass from more than one parent class). One problem with multiple inheritance is that two or more parents may use the same method signature, and since the subclass can inherit that method from only one of them, you need some way to resolve the conflict. By default, SOM uses left-path precedence, which is a fancy way of saying that the parent class on the left-hand side of the hierarchy wins. But if you prefer to use a different tie-breaking rule, you can create a new metaclass to override SOM's inheritance mechanism. Of course, you can really mess up your object hierarchy that way, but it's nice to know the flexibility is there.

SOM's flexibility is not without a price. The additional layer of indirection, plus the use of metaclasses, does incur some overhead—up to 20 percent in some applications—so it's better not to use SOM when you don't need language independence and you're making frequent calls to short methods. The Workplace Shell, however, typically uses lengthy methods and doesn't cost much in overhead.

SOM'S OBJECT HIERARCHY

To work effectively with the Workplace Shell, you need to become familiar with the SOM

class hierarchy as well as how the WPS fits into it. Figure 1 illustrates the relationship.

The root of all SOM classes is SOMObject. All classes derive their properties and behavior either directly or indirectly from SOMObject. Since each class is represented by a class object, and each class object must be an instance of a metaclass (remember that metaclasses are templates for classes and classes are templates for objects), the SOMObject class is also an instance of the metaclass SOMClass.

As we noted, metaclasses are objects too, so the next question is what class instantiates metaclasses? If you follow the logic rigorously, the answer would be a meta-metaclass, and you could go on forever up the chain from there. But life has to start somewhere, so the SOM model designates SOMClass to be the metaclass of all metaclasses (thus putting SOMClass in the curious position of being an instance of itself). SOMClass is also the parent class for all metaclasses. All metaclasses are derived from SOMClass. If all this sounds confusing, it is, but the main thing to remember is that methods invoked on classes come from SOMClass, and methods invoked on objects come from SOMObject.

Another important subclass of SOMObject is SOMClassMgr. This class maintains a registry of all the SOM classes that exist in the SOM runtime environment and helps to load and unload class libraries. (SOM class libraries are currently packaged as DLLs.)

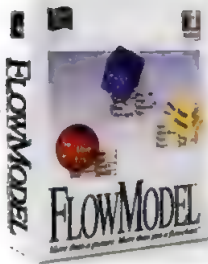
SOMObject, SOMClass, and SOMClassMgr, along with functions for initializing and customizing the SOM runtime environment, are packaged in SOM.DLL, which OS/2 loads at startup. When the SOM runtime environment starts, an instance of the SOMClassMgr class is created and remains until OS/2 is shut down. When a class is first referenced, the SOMClassMgr object loads the appropriate DLL and creates an instance of the class.

As we continue to descend, our arrival at the Workplace Shell is evident by the WP that prefixes all WPS classes. WPObject, the root class of all WPS objects, sits at the top of the WPS tree. Characteristics that are common across all WPS objects, such as a title or icon, are inherited from WPObject. Beneath WPObject fall three base classes—WPFileSystem, WPAbstract, and WPTransient—that differentiate the type of storage WPS objects use. All WPS objects fall under one of these three classes.

There's a lot more to say about storage classes, but this is a good place to stop. Next time, we'll dig into more detail on the WPS classes and show you how to use them in REXX applications. □

Gabrielle Gagnon is a Boston-based information technologies manager.

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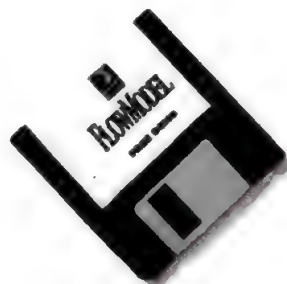
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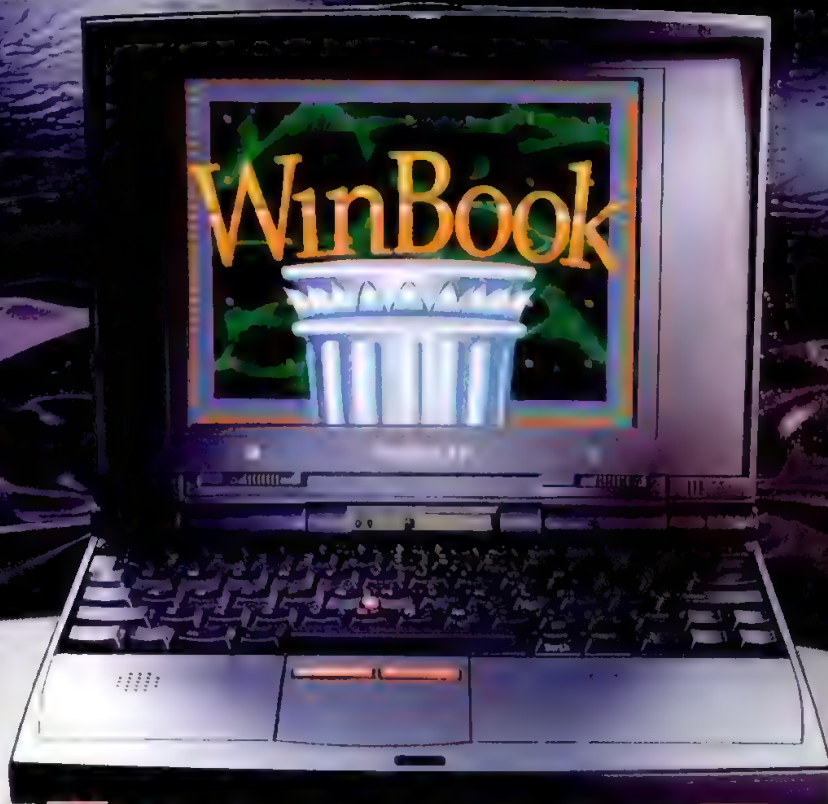


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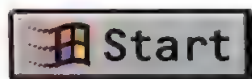
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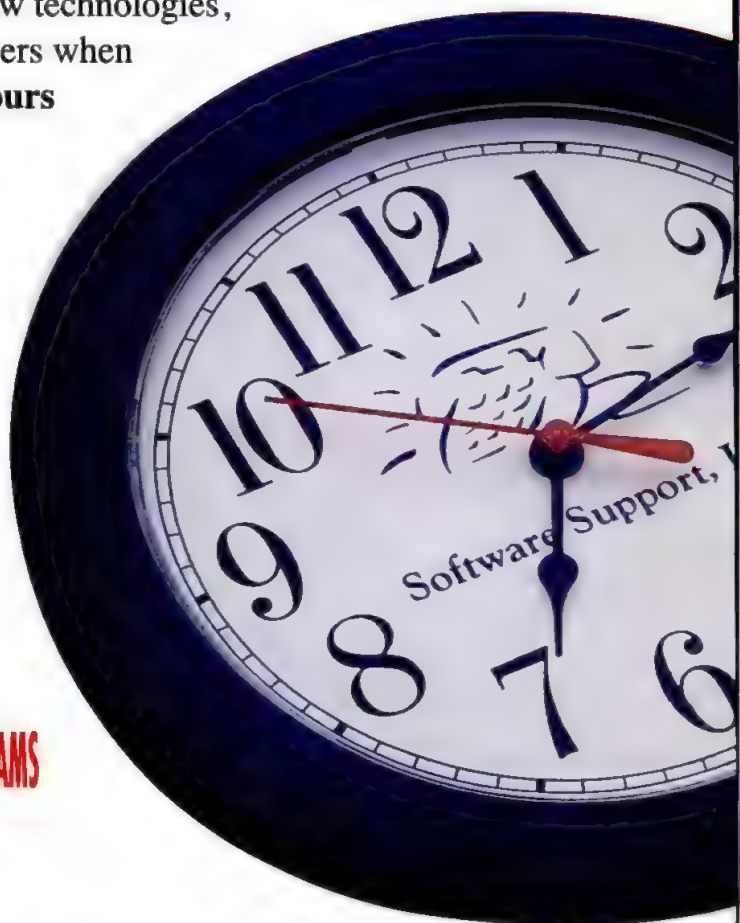
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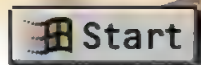
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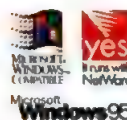
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Designed for Windows 95 Compatibility



By Douglas Boling

Launch as You Like It

Launch Windows programs minimized, maximized . . . however you want.

Just as the PIF Editor lets you describe how a DOS program is to be run, this issue's utility lets you describe how DOS and Windows 3.1 programs are to be run. The LaunchControl program has two components: an editor for its .LCD files and an engine that uses the data in .LCD files to launch specified programs the way you want them to run.

You can receive LaunchControl (both the executable and the source code) by downloading it from ZD Net on CompuServe, AT&T Interchange, or the Internet, or by requesting it through the mail. Refer to the sidebar "Guide to Our Utilities" for details. To recompile LaunchControl, you will need a compiler compatible with Microsoft C 6.0 that can compile Windows executables.

USING LAUNCHCONTROL

Install LaunchControl by copying the executable file LNCHCTRL.EXE into a directory listed in your PATH statement. You will also need to create an association in File Manager for the LaunchControl extension .LCD. To do this, start File Manager, select the File | Associate menu item, fill in the extension field with LCD, and fill in the program name field with the fully specified filename (path included) of LNCHCTRL.EXE.

Start LaunchControl by selecting the File | Run menu item in Program Manager and entering LNCHCTRL. If you didn't place LNCHCTRL.EXE in a directory listed in your path, you will need to include the path in the command. If you prefer, you can create an icon for LaunchControl in Program Manager.

Creating .LCD files is simple. Once LaunchControl starts, you should see a window like the one shown in Figure 1. Fill the first field in the LaunchControl window, Command, with the name of the program you want this .LCD file to launch. The command should include any necessary path information and command line parameters. You have the option of filling the field immediately below the Command field with a working directory for the program. Before LaunchControl launches the program, it will switch to the directory listed in this field.

Below the Command and Directory fields is a set of boxes. The one on the left lets you set the LCD parameters for running the program: Environment, Window Size, and DOS Attributes. As you select the different radio buttons, the contents of the Properties box on the right will change to show the appropriate controls for each parameter.

Initially, the Environment radio button will be selected. In it, the Properties box lets you set the environment variables to use with this program. When the radio button "Use Def. environment + variables" is set, the program

IN THIS ISSUE

LaunchControl

LaunchControl lets you control how DOS and Windows applications are launched under Windows 3.1. For Windows programs, LaunchControl lets you set the environment variables and the window size and position. For DOS programs launched under Windows, LaunchControl lets you automatically close Windows, run the program, and then restart Windows.



will be launched with the current environment variables plus any new variables listed in the list box. When the "Use only variables below" button is set, only the variables listed in the list box will be passed to the program when it is launched.

To specify the new environment variables, click on the Change button to the right of the Properties box. This will launch a dialog box that lets you add, edit, and delete environment variables. The combo box for entering new variables lets you select from a list of the current environment variables. You can manually enter a variable by typing the name of the variable followed by an equal sign and the value of that variable. To either select or type in a new variable, click on the Add button.

To delete a variable from the list, select the variable from the list and click on the Delete button. To edit a variable, double-click on the variable in the list box. The variable will be placed in the edit box for changing. When you finish editing the variable, click on the Add button. Adding a variable with the same name as one already in the list will replace the one in the list.

When you have completed the list of environment variables, click on the OK button to close the dialog box and save changes. You will see the variable list placed in the list box in the Properties box. To cancel the changes, click on the Cancel button.

Clicking on the Size radio button in the Parameters box lets you specify the size and position of a window. The controls in the Properties box will change to display a check box and fields for the size and position of the window. When the Default window size check box is set, LaunchControl will ignore the values in the size and position boxes and let the launched program set its own size and position. To reflect that they are ignored, the size fields are disabled when the check box is checked.

You can specify the window size and position by unchecking the check box. The position of the window is set from the top left corner of the window, which is position (0, 0). Both the position and the height and width values are in pixels. So, entering values of 100 and 200 for the horizontal and vertical positions, respectively, will tell LaunchControl to place the window so that the top left corner is located at position 100, 200 on the screen.

If you want to set the size of a window and use the default values for the position, you can enter -1 for either of the position entries. Conversely, if you want to set the position and not the size, place a -1 in either the height or the width entry fields.

The final set of LCD settings concerns DOS programs. If you select the DOS Attributes parameter, the Properties box contains three controls: a check box that I will discuss in a moment, an edit box that lets you specify the program's Window Description, and a Windows icon for the DOS program. Fill in the description field with the text you want the DOS program to use as its window title and icon label. You can change the icon by clicking on the Set Icon button. A dialog box will appear that is very similar to the Change Icon dialog box used by Program Manager's Properties dialog.

The Description and Icon settings are nec-

essary because when you launch a DOS program with LaunchControl, Program Manager cannot use its description and icon settings to set these values. This is because LaunchControl, not Program Manager, is starting the DOS program.

Checking the check box at the top of the DOS properties box tells LaunchControl to run the program outside Windows. LaunchControl will shut down the current Windows session and run the specified program in native DOS. As usual, any programs running at the time of the shutdown request the opportunity to prevent the shutdown. If a program does prevent the shutdown, LaunchControl simply terminates without launching the DOS program.

If the shutdown proceeds, then LaunchControl will restart Windows when the launched DOS program completes. If an error occurs when LaunchControl attempts to run the program, a message will be displayed in DOS before Windows is restarted. Note that when you check the Exit Windows box, the other controls in the window are disabled since they are not applicable to programs running outside Windows.

The final set of controls is located in the Startup box, which sits below the Properties box. The Startup box lets you specify whether a program is started in the normal, minimized, or maximized state. If you specify window size and position along with a minimized or maximized attribute, the size and position settings are used when the window is restored from its

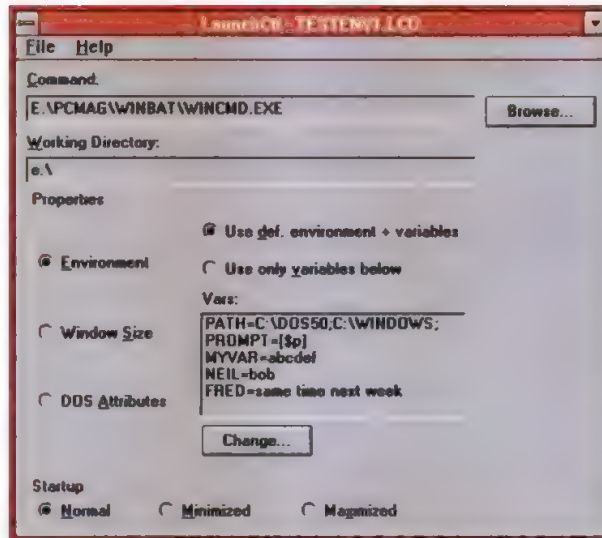


FIGURE 1: The heart of the LaunchControl interface is the Properties group box, which lets you set Environment, Window Size, and DOS Attributes.

initial iconic or maximized state.

Once you have specified all the settings for a program, save the parameters by selecting the File | Save menu item. A dialog box will be displayed with the default .LCD extension. While the filename is totally up to you, it is important to use the .LCD extension since both File Manager and Program Manager will use this extension to find the association with the LaunchControl program.

The other items on the File menu—New, Open, Save As, and Exit—operate as you would expect. The New menu item resets the values in the controls so you can create an

.LCD file from scratch. The Open menu item opens .LCD files for editing. Save As lets you save your current settings under a new name. Finally, the Exit menu item ends the program.

Once you have saved the launch information in an .LCD file, you can use the file to launch the associated program. Double-click on the .LCD file in File Manager, and the program specified in the .LCD file will be started using the environment variables, size, and position values you set in the .LCD file.

You can also create a program item for an .LCD file in Program Manager. Select the File | New menu item in Program Manager, select Program Item, and specify the name of the .LCD file in the Command Line field of the Program Item Properties dialog box. Be sure to include the .LCD extension. By default, the

icon for the .LCD file will be the same as that of its associated program, LaunchControl. Clicking the Change Icon button sets the icon to the icon of the program you're launching. Once you have filled out all the details in the dialog box, click on the OK button and Program Manager will create a program item for the .LCD file. Double-clicking on this icon will cause LaunchControl to launch the program specified in the .LCD file with the proper parameters and then quietly terminate.

LaunchControl has one limitation: If you are using LaunchControl to start a DOS program, you cannot use LaunchControl to set environment variables. This is because of the way Windows executes DOS applications. You can get around this limitation, however, by having LaunchControl start a .BAT file that sets the proper environment variables before launching the DOS program.

INSIDE LAUNCHCONTROL

LaunchControl uses a number of techniques to implement its different functions. To specify the environment variables, LaunchControl launches programs without the convenient WinExec or ShellExecute functions. To set a program's window size, LaunchControl waits until the window is created and then resizes it. And LaunchControl uses the Windows function ExitWindowsExec for launching a DOS program outside of Windows. Let's take a closer look at these techniques; while simple in concept, each of these tasks has a "gotcha" or two.

When I first designed LaunchControl, I expected to use the Windows function LoadModule to launch a program while specifying the environment. LoadModule takes two parameters: a pointer to the command and a pointer to a structure that contains the envi-

DOS Exec

IN:

AX = 4B00h
ES:BX = Pointer to parameter block
DS:DX = Pointer to name of program to launch

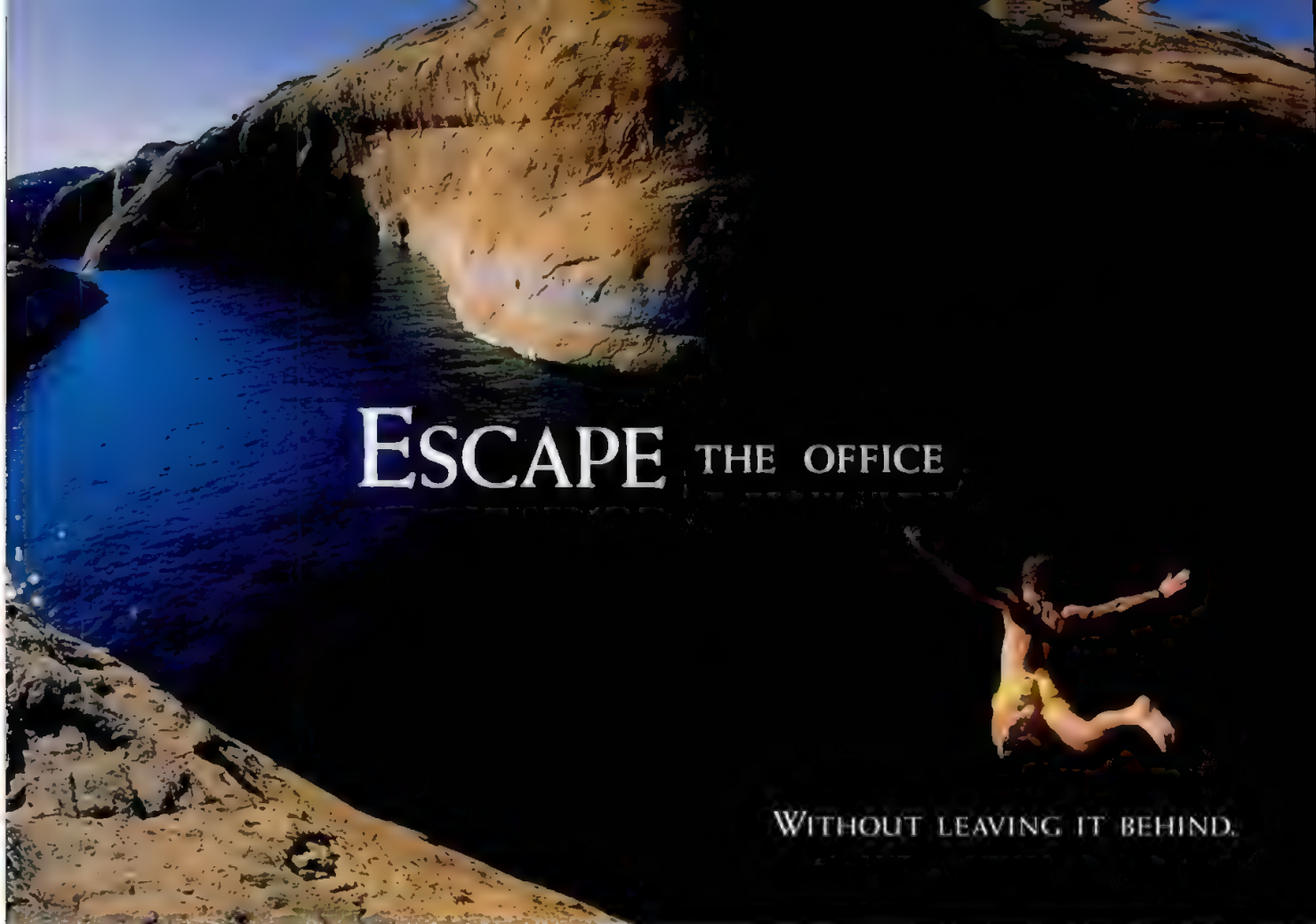
```
struct {
    envblk      dw      ?      ;Seg of child env blk.
    cmdline_ptr dd      ?      ;Ptr to cmd line.
    FCB1_ptr    dd      ?      ;for Windows:
                                ; pts to a 2 word array
                                ; arr[0] = 2,
                                ; arr[1] = nShow.
    FCB2_ptr    dd      ?      ;for Windows:
                                ; set pointer to 0.
}
```

OUT:

CF = Set if error
AX = return code
;for Windows:
; Instance handle of
; launched program.



FIGURE 2: The syntax for the Windows version of the DOS Exec function.



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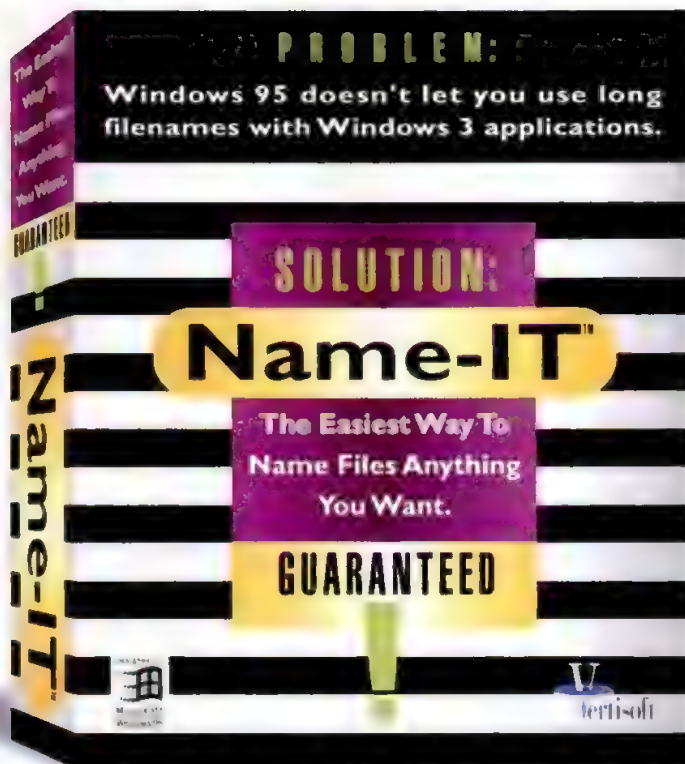


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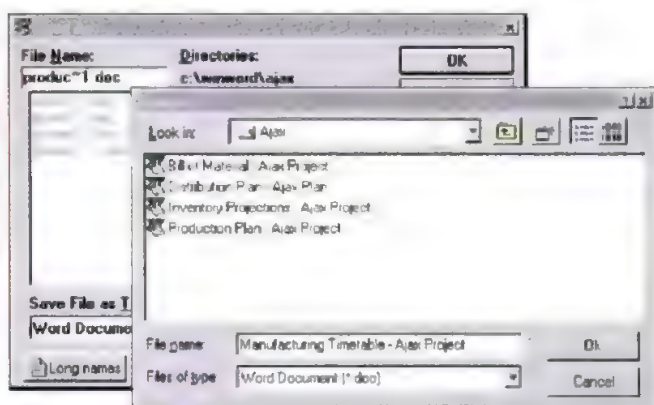
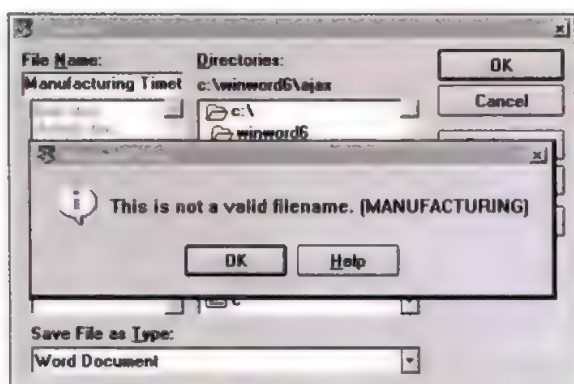


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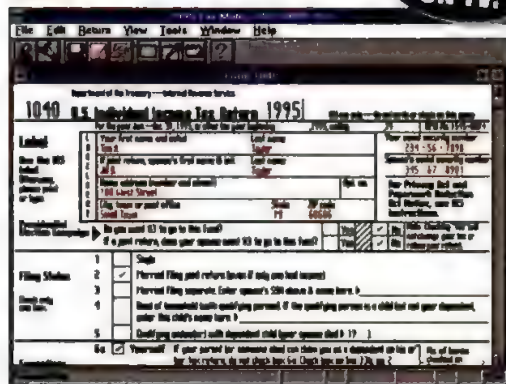


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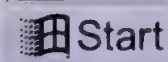
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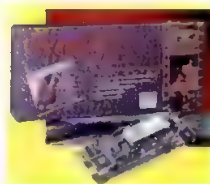
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ronment segment value, a pointer to the command line, and the standard ShowWindow parameter used to set how the launched program's window will be displayed. I was rudely surprised, however, when I found out that unlike WinExec, LoadModule cannot be used to start DOS programs!

After struggling with the problem, I discovered—or, more accurately, rediscovered—the simple fact that most DOS functions still work under Windows. So, instead of using a high-level Windows function, LaunchControl could use a simple DOS Exec call by performing an Int 21h with AX loaded with 4B00h! Strange as it may seem, this technique works, because Windows is basically a protected-mode DOS extender with a pretty face. Windows either passes Int 21 calls down to DOS or, where necessary, implements its own version of them. In the case of the DOS Exec call, Windows implements its own version of the function that does all the work (and more) for DOS, including detecting the difference between DOS and Windows applications.

Figure 2 shows the syntax for the Windows version of the DOS Exec function. Notice that instead of passing a pointer to the first File Control Block, you can specify the Show parameter by pointing the field to a two-word array. The first word of this array must be set to a 2; the second word in the array is the Show parameter.

Windows intercepts the call to the DOS Exec function, checks to see if the call is launching a DOS or a Windows program, and sets the necessary flags in the kernel. Windows then calls the LoadModule function in the appropriate manner, depending on whether it's starting a Windows or a DOS program. (For more details on how Windows launches programs, read Matt Pietrek's wonderful book *Windows Internals*, published by Addison-Wesley.)

Figure 3 shows the routine that uses the DOS Exec function to launch a program under Windows. Notice that the command line tail must have the correct DOS command line format: a length byte followed by the text itself followed by a carriage return byte. The routine calls the DOS function using the `intdos` function in Microsoft C. You will need to modify the code for compilers that do not support this non-ANSI C function. Also notice that like the Windows LoadModule function, the return value of the interrupt has either the error value (if less than 32) or the instance value of the program that was launched.

Launching a program outside of Windows proved to have twists as well. Windows provides a very convenient function, `ExitWindowsExec`, that shuts down Windows, runs a program, and then restarts Windows when that program completes. Unfortunately, this function has a few limitations.

The first limitation is that `ExitWindows-`

`Exec` confers no ability to control what directory the program will be launched from. Providing the path with the program name solves the problem of finding the program itself, but many programs need to be executed from a

specific directory to work properly. The second major problem with `ExitWindowsExec` is that if there is an error starting the DOS program, Windows just restarts without reporting the error to the user.

```
//-----
// WinExecEnv - WinExec call that also allows a custom
// environment.
//
// This function performs a DOS exec call. Windows' DOS
// extender will catch and translate into LoadModule. We
// can't use LoadModule directly because LM doesn't know
// how to handle DOS apps.
//
//-----
HINSTANCE WinExecEnv (LPSTR lpProg, UINT wShow,
                      WORD wEnvSeg) {
    struct {
        WORD    segEnv;
        LPSTR    lpCmdLine;
        LPWORD   lpwShow;
        LPWORD   lpwReserved;
    } exec_struct;
    WORD wShowArray[2];
    HINSTANCE hExec;
    char szName[128], szTail[128], *pEnd;
    union REGS inregs, outregs;

    // Parse command line
    lstrcpy (szName, lpProg);
    // Find end of file name
    lpEnd = GetEndofName (szName);

    // Copy command tail to another string
    lstrcpy (&szTail[1], pEnd);
    *pEnd = '\\0';

    //Tail must be 0 byte followed by tail terminated by CR
    szTail[0] = (char)1strlen (&szTail[1]);
    pEnd = &szTail[1] + (INT)szTail[0];
    *pEnd++ = 0x0d;
    *pEnd = '\\0';

    // Init show array. LoadMod requires that the first
    // int be set to 2.
    wShowArray[0] = 2;
    wShowArray[1] = wShow;

    exec_struct.segEnv = wEnvSeg;
    exec_struct.lpCmdLine = szTail;
    exec_struct.lpwShow = wShowArray;
    exec_struct.lpwReserved = 0;

    // DOS Exec
    inregs.x.ax = 0x4b00;
    inregs.x.bx = (WORD)&exec_struct;
    inregs.x.dx = (WORD)szName;
    intdos (&inregs, &outregs);
    hExec = outregs.x.ax;
    return hExec;
}
```

FIGURE 3: This routine uses the DOS Exec function to launch a program under Windows.



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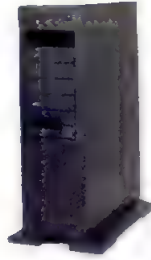


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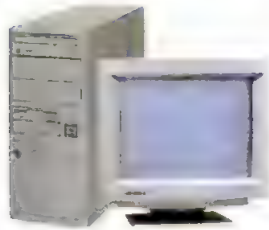
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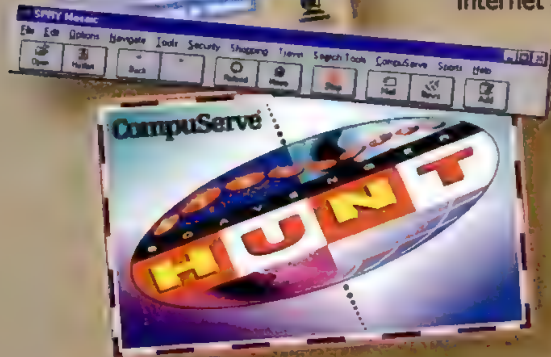
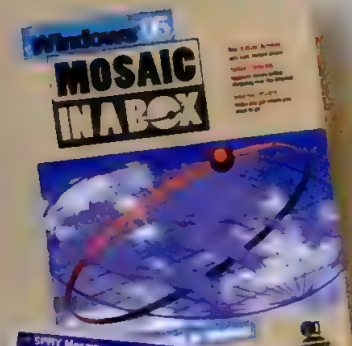
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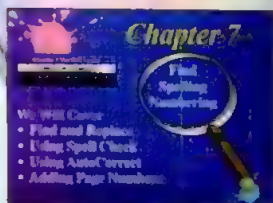
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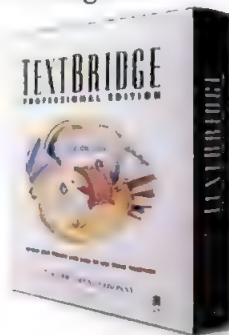
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To get around both these limitations, LaunchControl does not execute the DOS program directly. Instead, it launches a copy of itself outside of Windows. How is it possible to run LaunchControl—a Windows program—in DOS? The key is that inside each Windows program is a small DOS program. Usually this DOS program, called the DOS stub, prints the familiar error message “This program requires Microsoft Windows.” There is no reason, however, that another, more complex DOS program cannot be substituted for the typical DOS stub. An example of this is the Windows Setup program. When it’s run under DOS, you see a character-mode setup screen. When it’s launched in Windows, the graphical interface version is run. LaunchControl does something very similar.

When LaunchControl needs to run a program outside Windows, it uses ExitWindows-Exec to launch a copy of itself and passes the name of the .LCD file currently being interpreted. The LaunchControl DOS stub then opens the .LCD file passed to it, changes to the correct directory contained in the .LCD file, and launches the program using the native DOS version of DOS Exec. The DOS program is then run, and once it completes, Windows is

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- 6 **WINCMD** Command file interpreter
- 7 **SYSCAP** Captures system information
- 8 **MYGRPS** Customizes group icons
- 9 **WTIME** Keeps PC clock accurate
- 10 **PLICON** Places program icons

restarted. If the program cannot be launched for some reason, an error message is displayed. To be sure the error message is seen, LaunchControl waits for the user to press a key before it continues.

Setting a window size and position is easy compared with the program-launching logic. LaunchControl launches a program and then sets a system timer. When the timer messages are received (one every 250 milliseconds), LaunchControl checks each of the top-level windows to see if one was created by the started program. When it finds the window, LaunchControl uses the Windows function SetWindowPos to set the size and position of the window. If the program was initially started as an icon or maximized, the SetWindows-Placement function is used to control the restored position of a window. After setting the window’s size and position, LaunchControl kills the timer and terminates.

LaunchControl gives you more control over your Windows applications with an approach similar to that used by DOS PIF files. You select settings once, instead of manually adjusting them each time you launch the program. The programming methods that LaunchControl uses demonstrate that sometimes even the simplest Windows tasks require convoluted methods to get just the right result. □

Douglas Boling is a contributing editor of PC Magazine.

GUIDE TO OUR UTILITIES

ABOUT LAUNCHCONTROL...

PURPOSE LaunchControl lets you control how DOS and Windows applications are launched under Windows 3.1. For Windows programs, LaunchControl lets you set the environment variables and the window size and position. For DOS programs launched under Windows, LaunchControl lets you automatically close Windows, run the program, and then restart Windows.

LaunchControl performs its tasks by creating .LCD files, which are like advanced .PIF files. These files contain the launch data for each program you want LaunchControl to launch.

SETUP Copy the executable file LNCHCTRL.EXE into a directory listed in your PATH statement. Then create an association in File Manager for the LaunchControl extension .LCD. To do this, start File Manager, select the File | Associate menu item, fill in the extension field with LCD, and fill in the program name field with the fully specified filename (path included) of LNCHCTRL.EXE. LaunchControl is used in two ways: to edit .LCD files and to launch programs according to the settings in the .LCD files.

FILES FOR DOWNLOAD

LNCHCTRL.EXE—The executable program file.

LNCHCTRL.DOC—The documentation file.

LNCHCTRL.ZIP—The source, program, and documentation files.

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PC Solutions

TIPS AND TECHNIQUES TO INCREASE YOUR PRODUCTIVITY

User-to-User

By Neil J. Rubenking

Customize Your Windows 95 Shut-Down Screens

When you shut down Windows 95, it first displays a screen that says, "Please wait while your computer is shutting down." Then it shows another with the message, "You can now safely turn off your computer." The two screens are actually 256-color bitmaps, stored in the files LOGOW.SYS and LOGOS.SYS, respectively. When I took a closer look at these files, I found the bitmap signature—the characters BM. Each file is a 320-by-400 bitmap! This means you can easily personalize the Windows 95 shut-down screens.

To make your own shut-down screens, first create 640-by-400 bitmaps and then resize them to 320 by 400 pixels. It seems that Windows 95 will stretch the bitmap horizontally to twice its width, while keeping the vertical scale.

DEREK KWAN, via the Internet

PC MAGAZINE: If you have a good bitmap-editing program, it's not difficult to stretch or shrink images to fit particular dimensions, but doing it with the Windows 95 Paint Accessory is harder. Here are the steps to follow:

- Load your bitmap into Paint.
- Select Attributes from the Image menu, make sure the Pels (that is, pixels) radio button is checked, and note the image's width and height.
- Divide 640 by the width and convert the result to a percentage, rounding upward. For example, if the image were 480 pixels wide, the result would be 134 percent.
- Divide 400 by the height and convert that result as a percentage, rounding upward.
- Select Stretch/Skew from the Image menu, click the Horizontal radio button, fill in the width change percentage, and press OK.
- Select Stretch/Skew again, click the Vertical radio button, fill in the height change percentage, and press OK.
- If the result is too distorted, undo the last two steps then redo them using the smaller of the two percentages in each case.
- Select Attributes from the Image menu again and set the dimensions to precisely 640-by-400.

- If necessary, fill in any white space around the image.
- Use the Text tool if you want to add messages similar to those displayed by the original shut-down bitmaps.
- Select the entire image, then select Stretch/Skew and shrink to 50 percent in the horizontal direction.
- Select Attributes once more and set the dimensions to 320-by-400.

Save archival copies of the original LOGOW.SYS and LOGOS.SYS, then rename your new bitmaps to those names. Now when you shut down Windows 95, your custom bitmaps will appear. If you select shut-down but leave your computer running, LOGOS.SYS will remain on the screen. Thus you could use it to display a message like "Out to Lunch" or "Back at 3:00 P.M."

Comparing Two Path Variables

You suggested using the SHIFT command to compare two Path variables (Path and NewPath) in the Solutions column of February 21, 1995. I've found a better way (Figure 1), using the fact that DOS will not copy a 0-byte file. My batch file ECHOs the Path and NewPath variables to temporary files and then uses the FC (File Compare) command to check whether the files are the same.

As usual, I've tried to ensure that the batch file creates unique filenames for the temporary files, but the user should be aware that any filename matching PATH???.\$\$\$ will be deleted.

RICH DAVIES, Omaha, Nebraska

PC MAGAZINE: You'd think that DOS's FC program would set the ERRORLEVEL so that a batch file could determine whether two files are the same—but it doesn't. This batch file gets around that problem by piping the output of FC into FIND, looking for the string "no differences". But there's still a problem, because in older versions of DOS the FIND command doesn't set the ERRORLEVEL either. CPBAT redirects the output of FIND into a temporary file. If the files are the same, this file will contain a line of output from FC; if not, it will be a 0-byte file. As noted above, DOS's COPY command won't copy a 0-byte file.

HIGHLIGHTS



HARDWARE Alfred Poor explains digitized sound quality in voice mail and tells you what your best bet is for high-quality sound from a voice modem. *Page 548*



SPREADSHEETS Remember how Lotus 1-2-3 used to highlight locked cells in green? Well, now you can endow Excel 5.0 with that same capability by using a short macro. *Page 562*



GRAPHICS Switching from Page-Maker to QuarkXPress? How do you convert all of your old files to the new platform? Here are three suggestions. *Page 574*

OUR ADVISORS

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PC DIRECT starts here with exciting offers from top direct vendors. See index, page 548


```
@ECHO OFF
: CP.BAT      -- Compares variable NewPath with Path --
:           --      Rich Davies   Omaha, NE      --
ECHO Path: %Path%
ECHO NewPath: %NewPath%
echo %path% > path$$$$.$$$
echo %newpath% > pathnew$.$$$
fc /C path$$$$.$$$ pathnew$.$$$ | find "no differences" > path1$$$$.$$$
copy path1$$$$.$$$ path2$$$$.$$$ > nul
if exist path2$$$$.$$$ echo Paths are the same.
if NOT exist path2$$$$.$$$ echo Paths are different.
del path??$.$$$
ECHO.
```



FIGURE 1: CP.BAT compares the DOS Path with a variable called NewPath and reports whether they are the same.

```
@ECHO OFF
: CP.BAT      -- Compares variable NewPath with Path --
:           --      Rich Davies   Omaha, NE      --
ECHO Path: %Path%
ECHO NewPath: %NewPath%
echo %path% > path$$$$.$$$
echo %newpath% > pathnew$.$$$
fc /C path$$$$.$$$ pathnew$.$$$ | find "no differences">NUL
IF ERRORLEVEL 1 ECHO Paths are not the same
IF NOT ERRORLEVEL 1 ECHO Paths are the same
del path??$.$$$
ECHO.
```



FIGURE 2: This version of CP.BAT relies on the fact that modern versions of FIND set the ERRORLEVEL to indicate failure.

If your DOS version is new enough that the FIND command does set the ERRORLEVEL to a non-zero value when its search fails, use the batch file in Figure 2 instead. It runs a bit faster, because it doesn't need to create temporary files to determine whether FIND succeeded.

The /C switch for the FC command tells FC to ignore case in its comparison. The PATH command always converts its argument to uppercase, but you can also set the Path using SET PATH=, which does not. DOS doesn't care whether the directories in the Path are in upper- or lowercase. Because they use FC /C, these batch files don't care either.

You can download both files, archived as CD.ZIP, from PC MagNet.

Using Environment Variables in Windows

Here's a familiar problem: How do you return to the current directory after executing a batch file? My solution is to create an environment variable called CURDIR. Start by typing the command COPY CON SETCD.FIL and then enter SET CURDIR=^Z (where ^Z is the F6 key to terminate the copy). This is the only way I know to create a one-line file with no carriage return at the end; DOS's EDIT and most

word processors don't work.

Now run the commands CD > SETCD.DAT and COPY SETCD.FIL+SETCD.DAT SETCD.BAT. This creates a batch file with the line SET CURDIR= followed by the current directory name. When you run the batch file, it creates the environment variable CURDIR. You can then use the command CD %CURDIR% in a batch file to return to the original directory.

Even better, you can use this environment variable in Windows. As we become more document-centered and less application-centered, it makes less sense to keep Word documents in the Word directory and Excel spreadsheets in the Excel directory. It's usually a better idea to create a "project" directory that will include all documents related to a single subject. If this is your current directory, use the above procedure to create the CURDIR environment variable before entering Windows. In Windows, edit the Properties of each relevant application

icon so that the Working Directory reads %CURDIR%. That way every time you do a File | Open or File | Save, the dialog box will open with the relevant directory as default and you won't have a lot of mousing around to do with the drives and directories to get to the correct place. (Note: Not all applications will read the CURDIR in the Working Directory of the Properties, but it definitely works for Word, Excel, and PowerPoint.)

STEVEN TEIGER, Herzliya, Israel

PC MAGAZINE: Many Windows users don't realize that environment variables can be used in the Command Line and Working Directory entries for a program item's properties. In the PIF Editor, environment variables can be used for the corresponding entries and for the title as well. Starting applications in a previously stored directory is definitely this feature's most significant use, but you may find other uses for it. Do note, though, that making changes to the environment in a DOS box won't affect Windows' environment. You need to set up the variables you plan to use before starting Windows.

Figure 3 is a batch file that will get both the current directory and current drive into environment variables without the need for an ancillary data file. It creates a temporary batch file, GETDD\$1.BAT, which does nothing but set the DOS prompt to the main batch file's name followed by the current drive and directory. Then it executes this batch file under a secondary copy of COMMAND.COM, redirecting the output to another temporary batch file, GETDD\$2.BAT which contains nothing but a copy of the new prompt. Note that because the prompt was changed under a secondary command processor, it disappears when that processor terminates, so there's no need to save and restore the prompt.

The main batch file then CALLs GETDD\$2.BAT, which has the effect of re-executing the main batch with the drive and directory on the command line. This time around, the main file deletes the two temporary files and sets environment variables to the current drive and directory.

```
@ECHO OFF
REM GETDD.BAT - get drive and directory into e-vars
IF NOT '%2'=='' GOTO SecondTime
ECHO @PROMPT %0 $n: $p > C:\BAT\GETDD$1.BAT
REM DO NOT substitute CALL for COMMAND /C in next line
COMMAND /E:512 /C C:\BAT\GETDD$1.BAT > C:\BAT\
GETDD$2.BAT
C:\BAT\GETDD$2.BAT

:SecondTime
DEL C:\BAT\GETDD$$.BAT
SET Drive=%1
SET CurDir=%2
```



FIGURE 3: Run this batch file before entering Windows to get the current drive and directory into environment variables.

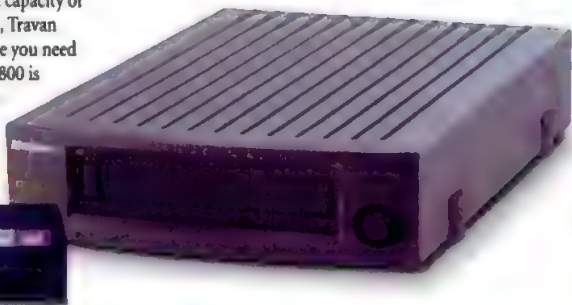
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HARDWARE

Monitor Mambo



When I exit Windows to DOS, the screen seems to jump or shake from side to side. On some applications, the image rolls as on a TV set, and I have to cycle the power several times to stop it. The image is stable under Windows, though. This leads me to believe that the problem has something to do with the video drivers rather than with the hardware, but I'm not sure how to fix it.

ROBERT BLAYLOCK, Garfield, New Jersey

PC MAGAZINE: I don't think drivers are the source of the problem, because it's rare to have a display driver loaded just for DOS. On the other hand, a hardware problem might well explain the shaky display. Fortunately, there's another possible cause, one that you may be able to fix with a simple configuration change.

The fundamental issue here is that the screen problems appear in DOS but not in Windows. Although your letter doesn't men-

tion it, I suspect you've configured Windows to run at a resolution other than the standard VGA 640-by-480. This would explain how the image could be stable under Windows but not under DOS.

The side-to-side shaking and the rolling image indicate that the monitor is not able to synchronize correctly on the signals sent from your graphics adapter; cycling the power to stop the rolling gives the monitor repeated chances to synch up, and eventually it manages to make sense of the signal.

Many graphics cards have configuration features that allow you to set the refresh rates for various resolutions. This is typically handled by a DOS utility that writes configuration data to an EEPROM on the graphics card. Your symptoms would seem to indicate that the monitor can synch satisfactorily on the signal used for the Windows resolution, but not for the VGA signal used in DOS.

The solution is to check for such a graphics card configuration utility and try setting the 640-by-480 refresh rate (or vertical scan) to 60 Hz. Any monitor billed as SVGA should be able to handle this without any problem.

If this fails to resolve the problem, it's time to check the hardware. Try temporarily substituting another monitor that is known to work correctly. If the problem doesn't show up on the second monitor, then the original probably needs adjustment, repair, or replacement. If the problem persists, follow the same procedure using a different graphics card.—*Alfred Poor*

Better Sound for Voice Mail

I have a small business that makes direct sales of audio products. My voice mail system provides the four mailboxes I need, but I'm not satisfied with the sound quality of the messages. To record a brief demo for the mailbox announcement, I simply play a cassette through my stereo and hold the telephone handset up near the speakers. I assume that the combination of poor microphone quality in the telephone and a low sampling rate in the voice mail system contribute to the "breathy" sound and other anomalies. I know I can't expect high fidelity across phone lines, but I'd like to improve the audio quality—without investing a whole lot more in the system. Any ideas?

DAVID HICKS, via fax

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INDEX

SYSTEMS	
AMS	586
CompUSA	554
COMPUTER DISCOUNT WAREHOUSE	557
Ergo Computing, Inc.	598
FOSA Computer Inc.	569
HARTFORD COMPUTER GROUP ..	553
INSIGHT DIRECT, INC.	588, 630
Magitronic	549
Midwest Micro Peripherals	565
MPC Technology	597
PCs Compleat	584
USA Flex	592
SOFTWARE/PERIPHERALS/ COMPONENTS	
APS Technologies	547
ARLINGTON COMPUTER PRODUCTS	596
COMPUTER DISCOUNT WAREHOUSE	557
CompuServe	551
CTX International	590
First Source International	575
HARTFORD COMPUTER GROUP ..	553
INSIGHT DIRECT, INC.	588, 630
LA Trade	580
Megahaus	550
Micro Solutions	599
Micron Computer, Inc.	564
Midwest Computer Works	582
PC Connection	594
PC Mall	578
Pro Direct	563
SPSS, Inc.	591

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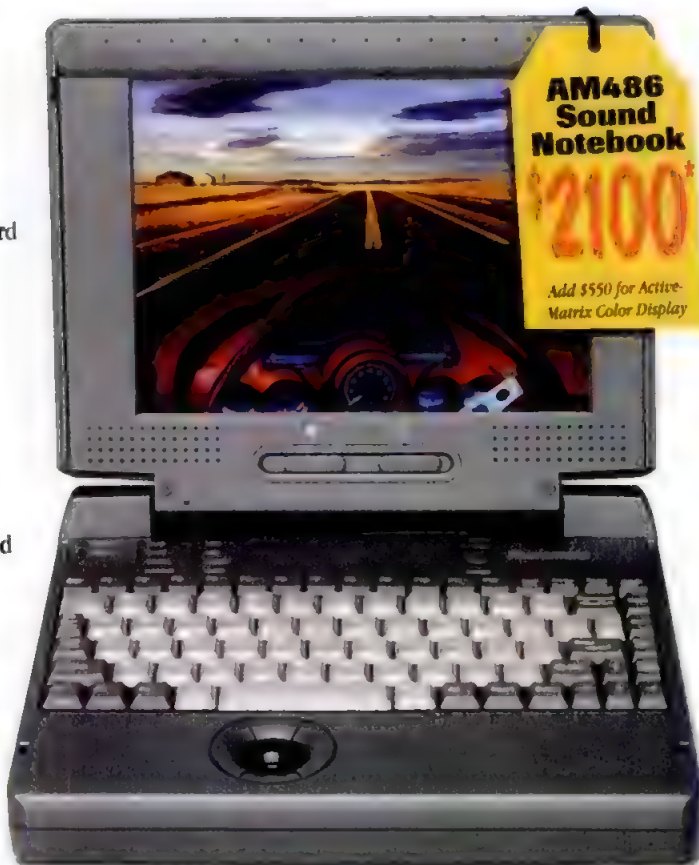
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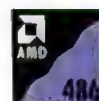
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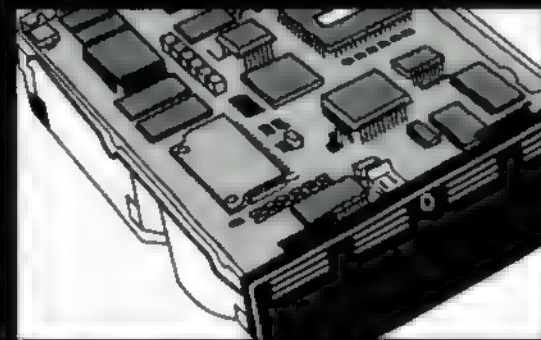
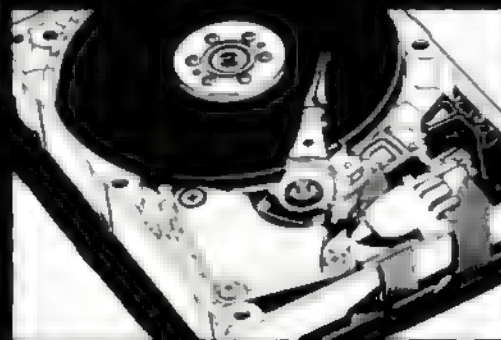
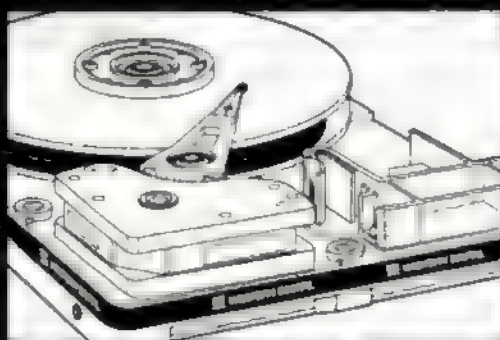
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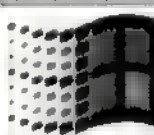
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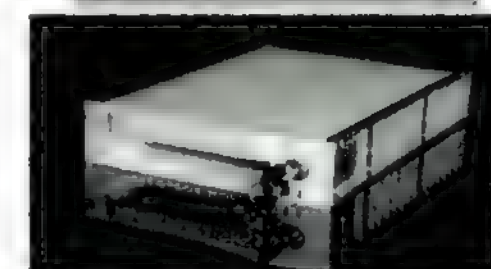
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CIRCLE 274 ON READER SERVICE CARD

PC MAGAZINE: You're right that you won't get CD-audio quality over a standard telephone line, but you can indeed do better. And the best news is that it may not cost as much as you think.

I assume your voice mail system uses digitized sound. Two key factors determine the quality of digitized sound: sampling size and rate. Roughly speaking, the sample size determines the dynamic range, which is the difference between the loudest and the quietest sounds; the sampling rate determines the upper limit of the frequency range. Audio CDs are recorded with 16-bit samples at 44.1 kHz for each of the two stereo channels. Even if you could find a voice mail system that could handle such a sound file, it would be a waste of resources; regular telephone lines can't transmit that level of quality.

Many PC-based voice modem cards provide relatively low sound fidelity; some use only 2-bit samples at a 4,800-Hz rate. While this saves on hard disk space, it produces poor-quality sound along with plenty of background hiss. Some cards based on the Rockwell chip set are capable of digitized sound at 7.6 kHz with 16-bit samples. This should allow for more than ample dynamic range (reducing the background hiss), while providing adequate frequency response.

Your best bet would be to find both a digitized sound card and a voice modem on a single board. A wide range of software is available for handling the voice mail functions, and many of these packages are capable of recording mailbox greeting announcements directly through the sound card's microphone input. Most of these same products can also record from a line input on the sound card.

For more information about voice modem software packages, see "At the Sound of the Beep..." in our issue of June 13, 1995.

—Alfred Poor

OPERATING ENVIRONMENTS

Slow-Motion Copying



One of our applications uses 1,278 small ASCII data files, ranging in size from 256 bytes to around 1K. These files are normally stored in one subdirectory, but whenever we want to copy all of the files from one directory to another, the time interval between two consecutive files slowly increases, up to more than 1 second per file at the end of the copy. This occurs with COPY or XCOPY and with DOS 5.0 or 6.2.

The situation gets even worse if, after the first copy, we go to the destination directory, do a DEL *,*, don't defragment the disk, and then repeat the same copy. Can you tell me what's going on?

JEAN LEFEBVRE, Montreal, Canada

PC MAGAZINE: DOS's FAT-based file system is optimized for quick access to large files. The disk space occupied by a file doesn't have to be one big block, it can be scattered in clusters all over the disk. That makes it easy for DOS to create or expand files quickly and to locate a particular portion of a file.

But the file system is not optimized for large directories, and that's the source of your problem. To create a new file in a particular subdirectory, DOS must first create a directory entry for that file. It starts at the beginning of the subdirectory and checks each entry, looking for one that contains a deleted file's name or one that's never been used. If it reaches the end of the subdirectory without finding an entry that it can use, DOS expands the subdirectory by one cluster of disk space and starts looking again.

Each directory entry takes 32 bytes, so your subdirectory of 1,278 files is nearly 40K in size. For each new file, DOS searches the entire subdirectory to find a directory entry, and this sequential search is far from efficient. As you've noticed, the more entries there are, the slower the process gets. If at all possible, find a way to distribute your program's data files into several directories. If that's not possible and your reason for copying the files is simply to make a backup, at least back the files up to several directories.—Neil J. Rubenking

An Easy Fix for a Debug Script

I'd like to have my PC power up with NumLock turned off. I tried to create the program NLOCKOFF.COM using the following DEBUG script:

```
A 100
MOV AX,40
MOV DS,AX
AND BYTE PTR[17],DF
INT 20
RCX
C
NNLOCKOFF.COM
■
□
```

I planned to put NLOCKOFF.COM into my AUTOEXEC.BAT file so that my PC would boot with NumLock off. But every time I tried to create the .COM file, my PC would hang, and I'd have to reboot. Is there something wrong with this script? Or is there a better way to do the job?

JOÃO BARROSCO,
Beijing, People's Republic of China

PC MAGAZINE: The only difference between this DEBUG script and one that works is a blank line: You need to insert a blank line

after the INT 20 line and before the RCX line. This blank line tells DEBUG that it has finished assembling machine code instructions and can go back to processing its own internal commands. Without the line, DEBUG stays in assembler mode and tries to process internal commands as machine code instructions. Because the Q command doesn't get processed, DEBUG doesn't quit. And since all its input was coming from the now-finished script, you have no way to make it quit except to reboot. Add the blank line and all will be well.

To create a script that turns NumLock on instead, just change the line

```
AND BYTE PTR [17],DF
```

to

```
OR BYTE PTR [17],20
```

and, a few lines later, change NNLOCKOFF.COM to NNLOCKON.COM.

Starting with DOS 6.0, a line in your CONFIG.SYS file lets you control the initial NumLock state. Just use NUMLOCK=OFF to force it off and NUMLOCK=ON to force it on.

—Neil J. Rubenking

Printing Windows Help Files

I often like to print out Windows Help files, because it's more convenient to work with them that way. But using the Print Topic command in Help produces a printout that's less than ideal. I've configured Print Manager to print-to-file and viewed the contents, but this just produces an unreadable collection of symbols when imported to Word. Is there any way to make Help files readable to a text editor so I can format the text as I like?

EUGENE McDONALD,
King's Park, New York

PC MAGAZINE: You've almost found the solution. When you configure a printer for printing to file, the resulting file contains the exact characters and bytes as well as the other codes that would be sent to the printer. As you've noted, this may well be an unreadable collection of symbols. What you need to do is use the Printers applet in Control Panel to install a Generic / Text Only printer. Then press the Connect... button and select FILE: from the list box to create a text-only printer that prints to file.

When you're ready to print Help topics to file, first choose Print Setup... from WinHelp's File menu and select this printer. Now each time you print a topic, you'll be prompted for a filename. You'll have to choose a different filename for each topic. Store all the files in a newly created directory and give them se-

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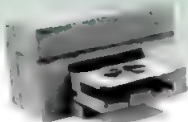
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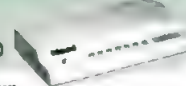
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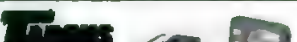
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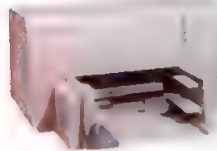
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quential names, perhaps HELP.001, HELP.002, and so on. When you're done, open a DOS box, switch to that directory, and issue the command

```
COPY HELP.* ALLHELP.TXT
```

The result will be a text document containing all of the Help topics in order, with a hard page break separating the topics. You can now load it into Word or another word processor and clean it up for printing. It will require some cleanup work because of how underlined and bold text are handled. A line of text that includes underlining will be printed twice, once with just the underline and once with the text, separated by a carriage return but no line-feed. A line that includes bold text will be printed three times, twice with only the bold text and once with all the text, again with just a carriage return in-between.

How can you be sure you've printed all the topics? A little-known WIN.INI line can help here. In the [Windows Help] section of WIN.INI, add the line

```
SeqTopicKeys=1
```

This enables the sequential topic keys, Ctrl-Shift-Home and Ctrl-Shift-⟳. Press Ctrl-Shift-Home while in WinHelp to jump to the topic that's first in sequence (usually the Contents topic). Now repeatedly press Ctrl-Shift-⟳ (the dedicated right arrow, not the one on the numeric keypad) to step through the topics in sequential order. When you reach the last one, you'll get a "Help topic not found" error message twice. Print each topic as you go and you'll have a complete record of the Help file's text.—Neil J. Rubenking

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WORD PROCESSING

Working with Large Documents in Word for Windows



I'm having a problem with master documents in Word for Windows 6.0c. The master document consists of 12 subdocuments that total less than 40 pages, but they contain numerous OLE 2 MathType equations and a few imported graphics. This results in a total file size of about 700,000 bytes. When working on the file I repeatedly get the message, "Word has insufficient memory. Do you want to save as RESCUE.DOC? WARNING: This operation will save all text in the master

document, but not its structure."

Is there any workaround for this problem? I can't believe that a high-powered word processor such as Microsoft Word can't handle a typical mathematics paper of this length.

WILLIAM L. SMITH, Godfrey, Illinois

PC MAGAZINE: WinWord can certainly handle the kind of document you're talking about. But master documents can't. The simple truth is that WinWord's master document feature promises a lot more than it can deliver.

Part of the problem is that keeping track of all those subdocuments eats up file handles like popcorn—a minimum of two file handles for each subdocument and more as you edit each document. But Windows runs under DOS, and DOS allows only a limited number of file handles. The result is that even though the WinWord manual says that master documents can have up to 80 subdocuments, Microsoft says the actual limit is really about 20. However, Microsoft also says that the actual number will vary, depending on how much memory you have and how many links and embedded objects are in the documents.

According to Microsoft, however, the particular error message Mr. Smith is getting indicates that he's tripping over a different problem with master documents, namely that WinWord is running out of available system

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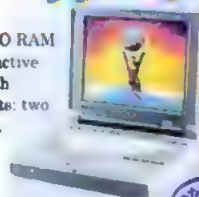


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resources during the save.

Although Microsoft suggests a number of possible workarounds, the best strategy for handling large documents in WinWord is simply to ignore the master document feature entirely. If you want to keep different sections of a document in their own files, work on them as separate files and then tie them together in other documents with Includetext fields for printing and with RD (Referenced Document) fields for generating tables of contents and indexes. Includetext fields let you merge all or part of a file into the current file. RD fields let you reference a document file to include when generating a table or index. For more information on these fields, choose Help | Contents, then Reference Information, then Field Types and Switches, then Field Types, and look up the fields in the alphabetical index.

The other alternative is just to keep everything in one file. I've managed entire books in a single file that ran well over a megabyte without any problems. You can even jump to any part of the document quickly—much as you can with master documents—without having to wade through large chunks of text. To do this, simply use the collapsible outline feature to collapse the document to show headings, and then jump to the desired heading.

The moral: Don't give up on WinWord for long documents, but don't even consider using the master document feature.

—M. David Stone

SPREADSHEETS

Marking Locked Cells in Excel



Early versions of Lotus 1-2-3 showed locked cells in green. It was very convenient to be able to see at a glance which cells were locked. For some reason, Microsoft Excel doesn't show locked cells in a distinctive way. The following Excel, Version 5.0 macro changes the background color of all locked cells in a selection to red.

```
Sub ShowLocked()
    Dim OneCell

    For Each OneCell In Selection
        If OneCell.Locked = True Then
            OneCell.Interior.
                ColorIndex = 3
        End If
    Next OneCell
End Sub
```

First select the range of cells you are interested in; then execute the macro. The macro uses a For Each loop to examine the selected cells.

Within the loop, an If statement tests each cell. If a cell is locked, the macro changes the cell's interior (background) color to red.

You can run this macro only when the sheet you are testing is unprotected. If the sheet is protected, you can't change the color of the locked cells.

MICHAEL TROMBETTA,
Manhasset, New York

PC MAGAZINE: You can avoid the inscrutable error message that appears when you run Mr. Trombetta's macro on a protected sheet by adding the following line above the For Each loop:

```
ActiveSheet.Unprotect
```

Lotus 1-2-3 also removed the distinctive color from a cell if you subsequently unlocked it. You can make Mr. Trombetta's macro perform similarly by modifying the For Each loop as follows:

```
For Each OneCell In Selection
    If OneCell.Locked = True Then
        OneCell.Interior.ColorIndex = 3
    Else
        OneCell.Interior.ColorIndex =
            xlNone
    End If
Next OneCell
```

Alternatively, you might prefer to create two separate macros and attach each as commands to your Tools menu. The first macro would lock all cells in a selection and color them red; the second would unlock all cells in a selection and remove the red coloring. The following bits would do the job:

```
Sub LockSelection()
    ActiveSheet.Unprotect
    With Selection
        .Locked = True
        .Interior.ColorIndex = 3
    End With
End Sub

Sub UnlockSelection
    ActiveSheet.Unprotect
    With Selection
        .Locked = False
        .Interior.ColorIndex = xlNone
    End With
End Sub
```

The red background Mr. Trombetta chose is a good deal less subtle than the green text 1-2-3 used. If it feels too loud, try other contrasting formats. Experiment with changes to the text color as well as changes to the background, and use the macro recorder to find out what VBA code you need to achieve the format you like best.—Craig Stinson

DATABASES

Playing Sound Files in Microsoft Access



I want to add sound to my Microsoft Access application. Specifically, I want to play recorded .WAV sound files at certain points in my program. How can I do this?

PETER ALLEN, Syracuse, New York

PC MAGAZINE: You need to call the Microsoft Windows API function named SndPlaySound to play the .WAV sound files. To use a Windows API function in Access, you first use the Access Basic Declare statement to register the function and define its arguments and return type. Then you can call the API function directly from your Access Basic code. The Declare statement in Figure 4 shows how to declare the SndPlaySound API function.

The SndPlaySound API function accepts two parameters. The first defines the sound to play and the second supplies optional flags that affect how the sound is played. The first parameter can be either the name of a .WAV file or a keyname in the [sounds] section of your WIN.INI file. The second parameter accepts some combination of the values shown in the Const lines (SND_SYNC, SND_ASYNC, and so on) in Figure 4. You can combine values by adding them together. For example, to play a sound continuously, you could use SND_ASYNC + SND_LOOP as the second parameter to SndPlaySound. You'll probably use SND_ASYNC most often—it tells Windows to start playing the sound and immediately return control to your Access program without waiting for the sound to finish.

Once you've placed the code in Figure 4 into a module in your Access database, you can call the SndPlaySound to API function directly. For example, to play the RINGIN.WAV sound file when a command button is clicked on a form, you would place the following code in the event procedure for the command button:

```
Dim x As Integer
x = SndPlaySound("ringin.wav",
    SND_ASYNC)
```

You might then add code to check for a proper return value from SndPlaySound. If x does not equal 1, then SndPlaySound could not play the sound.

If you're always going to play sounds asynchronously, you could use the PlaySoundAsync function shown in the bottom of Figure 4 instead. For example:

```
Dim x As Integer
x = PlaySoundAsync("ringin.wav")
```


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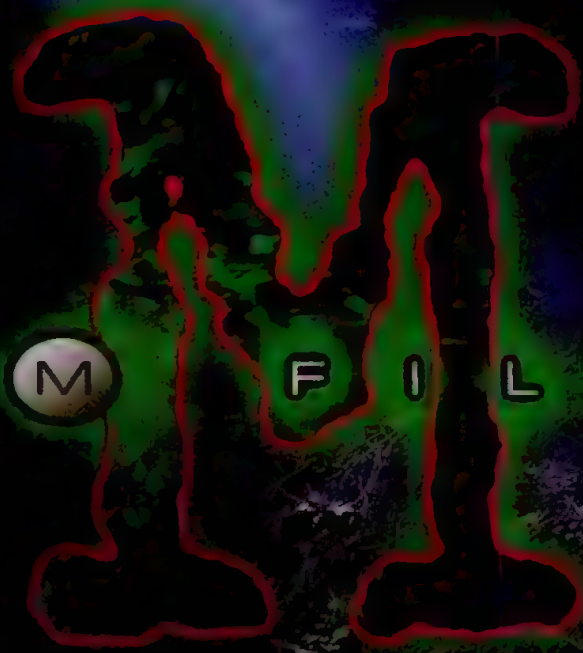
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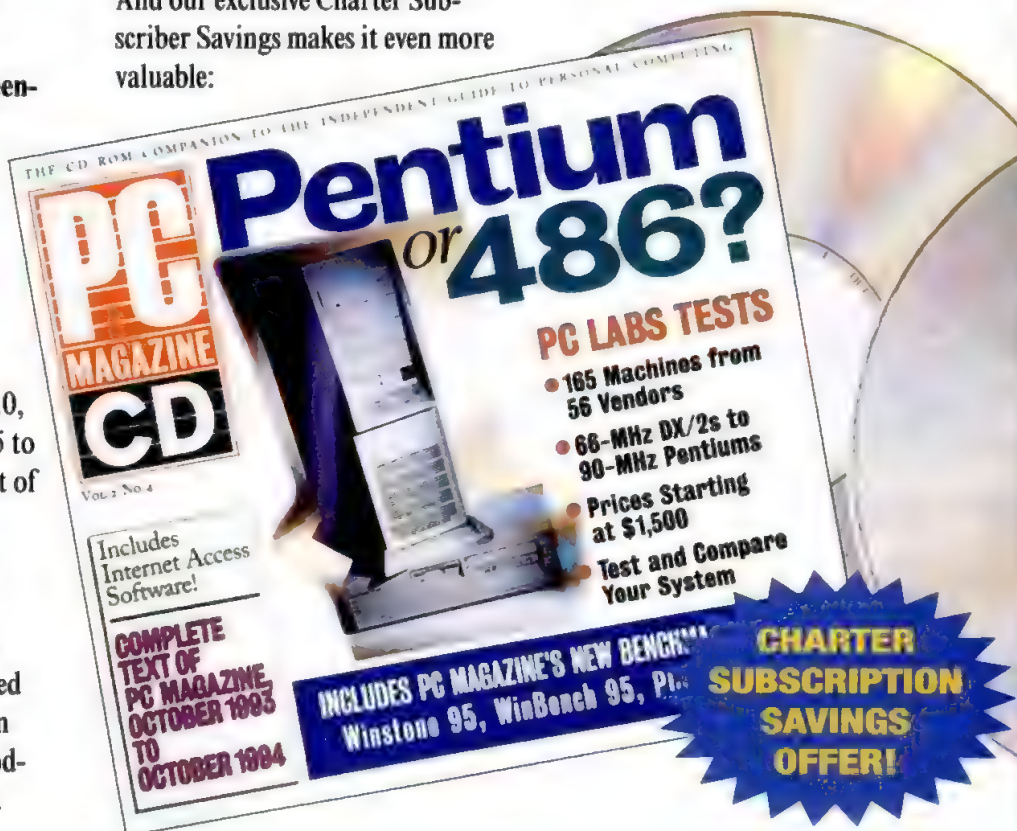
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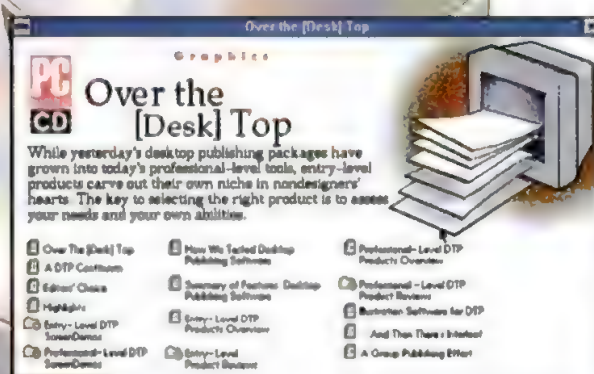
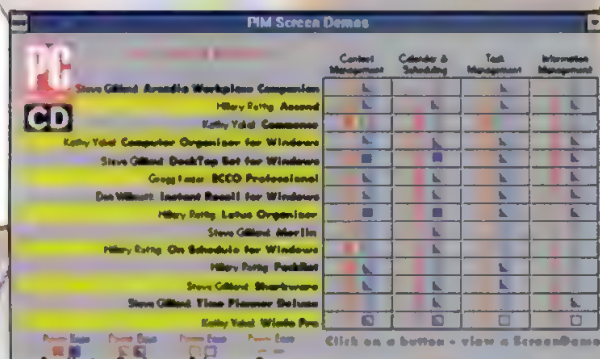
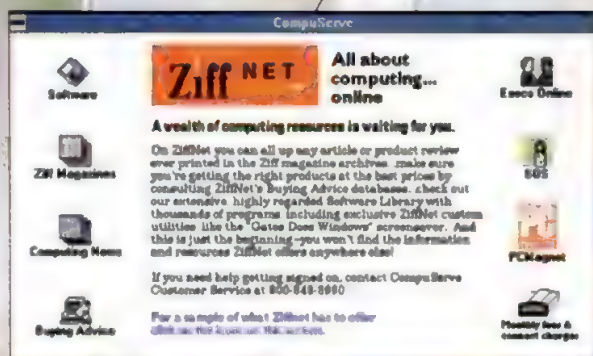


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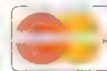
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```
' Declarations section
'
Option Compare Database 'Use database order for string comparisons
'
Declare Function sndPlaySound Lib "MMSYSTEM" (ByVal lpszSoundName As
String, ByVal uFlags As Integer) As Integer
'
' Constants for the SndPlaySound API
'
Global Const SND_SYNC = &H0 ' play synchronously (default)
Global Const SND_ASYNC = &H1 ' play asynchronously
Global Const SND_NODEFAULT = &H2 ' don't use default sound
Global Const SND_LOOP = &H8 ' loop the sound till next sndPlaySound
Global Const SND_NOSTOP = &H10 ' don't stop any current playing sound
'
' Function PlaySoundAsync
' Calls Windows API function SndPlaySound to play a
' sound asynchronously.
'
Function PlaySoundAsync (ByVal strSoundName As String)
PlaySoundAsync = SndPlaySound(strSoundName, SND_ASYNC)
End Function
```



FIGURE 4: This code demonstrates the statements needed to play .WAV files in your Microsoft Access programs.

For more information on SndPlaySound, see the Windows SDK Multimedia Programming Guide either in printed form or on the Microsoft Developer Network Development Library CD (which I highly recommend).

You can download the code in Figure 4 from ZD Net. Look for PSOUND.AB in the Spreadsh/DBMS Library of the Utilities/Tips Forum (GO TIPS).—*Sal Ricciardi*

GRAPHICS

Converting PageMaker Documents to QuarkXPress

 I've been a PageMaker user for years, but I'm considering switching to QuarkXPress. My problem is that I have hundreds of PageMaker, Version 4.0 documents. Though I don't use them all on a daily—or even weekly—basis, they are all active documents within the company, and I simply can't spare the time to reconstruct them all in QuarkXPress. Is there an easy way to convert PageMaker documents to the QuarkXPress format?

JILL THAU, New York, New York

PC MAGAZINE: As with all things graphical, the Mac is still slightly ahead of Windows. So I wasn't too surprised to find that the only currently available utilities for converting from PageMaker to QuarkXPress format exist exclusively on the Mac. PM→QXP, from Markzware (\$79), is a QuarkXtension that installs as

an import filter within QuarkXPress. Similarly, PM→QXP Converter (\$69) is an Apple-scripted utility that handles the conversion externally. Both programs work with PageMaker, Version 4.0 and PageMaker, Version 5.0 documents. The programs are available through Xchange, the source for QuarkXPress Xtensions and utilities. You can reach Xchange at 800-788-7557.

Why do I recommend Mac-based utilities to a PC user? It's simple: Both PageMaker and QuarkXPress create documents that are binary-compatible across platforms. You can open a Windows PageMaker document on the Mac, use Mac-based QuarkXtensions to convert the files to Mac-based Quark documents, and then bring the QuarkXPress documents back over to your PC.

This circuitous conversion process does have some drawbacks. For example, you must be sure that the graphics you are transferring between the PC and the Mac are cross-platform-compatible for both programs. That means that .BMP files, which are Windows-specific, are a no-no. Encapsulated PostScript (EPS) and Tagged Image File Format (TIFF) files, however, should move from platform to platform without a hitch. You must also make sure that your Windows setup and the Mac system have identical fonts installed. If not, you'll be forced to deal with font substitutions.

If you are looking for a Windows-based solution, you have fewer options. By the time you read this, a QuarkXtension for Windows from Azalea Software (800-482-7638 or 206-932-4030) should be available. This utility will use Dynamic Data Exchange (DDE) to drive

PageMaker remotely from within QuarkXPress. DDE will allow Azalea to access all of PageMaker's objects without explicitly decoding PageMaker's file structure. Its advantages include speedy translation of documents and compatibility with future versions of PageMaker. Its biggest disadvantage (especially from your point of view) is that it requires you to use a version of PageMaker with robust DDE support—and that means PageMaker 5.0.

At a minimum, you can transfer the text in your documents by exporting PageMaker items in rich text format (RTF). This will preserve text formatting, such as font and point size, and text attributes, such as italics or bold-face. Most other aspects of the layout will have to be reconstructed, however, either because PageMaker does not export them as part of the RTF file or because QuarkXPress doesn't explicitly support a formatting feature. For example, Quark does not offer typographic controls for either page or column breaks, which can force you to repaginate a publication by manually adjusting the size of text frames.

The wackiest workaround for your problem involves generating each page of your PageMaker publication as an EPS file. In order to create an EPS file from within PageMaker, you must have a PostScript printer installed. Encapsulated PostScript output is available as part of the Print Options dialog box in PageMaker 5.0. If you're still using PageMaker 4.0, you'll have to use the Windows Print Manager Setup Options dialog instead. The EPS format will accurately reproduce your layouts, including text formatting, graphic placement, and column breaks. Ultimately this is not a fully satisfactory solution, however, because EPS files are treated as graphics and therefore cannot be edited in QuarkXPress.—*Luisa Simone*

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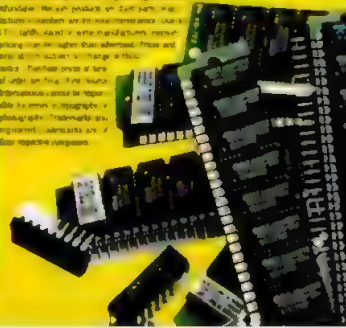
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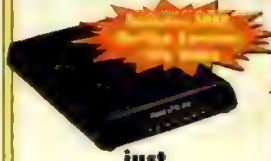
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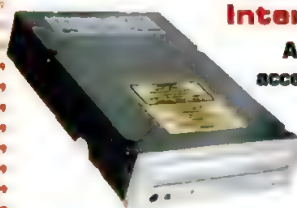


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486DX4/75	10.4" Active	520MB	3149
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486DX2/50	10.4" Active	360MB	\$2999
486DX2/50	10.4" Active	540MB	3299
486DX4/75	10.4" Dual Scan	360MB	3149
486DX4/75	10.4" Dual Scan	540MB	3449
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486DX4/75	9.5" Active	340MB	2399



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Processor	Screen	HD	Price
Pentium 75	10.4" Dual Scan	500MB	\$3799*
Pentium 75	10.4" Active	772MB	4499*
Pentium 90	10.4" Active	1.2GB	5299

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486DX4/75	9.5" Active	350MB	2299*
486DX4/75	9.5" Active	350MB	2599
486DX4/75	9.5" Active	540MB	2799

Additional NEC Products

Model	Processor	MB	Price
NEC Ready Multimedia			
Minitor 5010	486DX4/100	540MB	\$1499
Minitor 7020	Pentium 75	850MB	1799
Minitor 9010	Pentium 90	850MB	2099
Minitor 9510	Pentium 90	1.2GB	2499
Minitor 9520	Pentium 100	1.2GB	2799

Monitors priced separately



NEC Versa 4000

- Built-in CD-ROM Drive* (Standard on some models, optional on others)
- Pentium 75MHz and Pentium 90MHz processors
- 256KB Level 2 cache to optimize performance
- Unbelievable displays - 65K color Dual Scan, 16.8 million color Active High resolution Active Matrix displays available - 800x600 res.)
- Built-in 16-bit sound, microphone, MIDI and 2 built-in speakers
- Multimedia docking station with outstanding Alice Lancing 4-speaker array

Processor	Screen	MB	Price
Pentium 75	10.4" Dual Scan	540MB	\$3499
Pentium 75	10.4" Dual Scan	540MB	3799*
Pentium 75	10.1" Active	540MB	4199
Pentium 90	10.1" Active	810MB	4899*
Pentium 90	10.4" High Res.	810MB	5099

*Features built-in CD-ROM drive standard

COMPAQ



Contura 410

Product differs slightly from photo

Contura 420/430

- 10.4" Active & Dual Scan
- Fast 486DX4/75 or 486DX4/100 processors
- Optical trackball - smoother & more reliable
- High capacity drives - up to 720MB
- Compaq 3-year worldwide warranty

Processor	Screen	MB	Price
486DX4/75	10.4" Dual Scan	420MB	\$2459
486DX4/75	10.4" Active	420MB	3029
486DX4/100	10.4" Dual Scan	720MB	2839
486DX4/100	10.4" Active	720MB	3499



LTE Elite

LTE Elite

- 10.4" Active Matrix display
- Fast 486DX4/75 processor
- Built-in AC adapter - small, sleek design & reduced weight
- Upgradable hard drive - easily add more storage

Processor	Screen	MB	Price
486DX4/75	9.5" Dual Scan	340MB	\$2739
486DX4/75	9.5" Dual Scan	510MB	2999
486DX4/75	10.4" Active	510MB	4159
486DX4/75	10.4" Active	810MB	4539

PCM 10/95

TOSHIBA



Call about Exciting New Toshiba Notebooks Tecra 700 Series

- 120MHz Pentium
- 4X CD-ROM Drive (Swap with floppy)
- PCI Bus
- 11.3" displays
- 1.2GB Hard Drive

Satellite Pro 400

- Built-in 4X CD-ROM Drive (Swap floppy and CD-ROM) (Active model only, optional on Dual Scan)
- Pentium 75MHz Processor
- Built-in 16-bit sound, microphone, speaker & MIDI
- 10.4" Active & Dual Scan
- Built-in AC adapter - small, sleek design & reduced weight
- Integrated Accupoint - small, accurate & easy to use
- Lithium Ion battery technology
- Built-in infrared for no-hassle printer connections

Processor	Screen	MB	Price
Pentium 75MHz	10.4" Dual Scan	772MB	\$3539
Pentium 75MHz	10.4" Active	772MB	4359



Portégé 610CT

90MHz Pentium

- Pentium 90MHz Processor
- 9.5" True Color display for optimum color
- Built-in 16-bit sound (SoundBlaster Pro compatible) microphone & speaker
- Lithium Ion battery technology
- Accupoint stick for easy control

Processor	Screen	MB	Price
Pentium 90MHz	9.5" True Color	720MB	\$4359



Portégé 610CT

Satellite T2110/T2130

- 10.4" Dual Scan & Active
- Built-in AC adapter - small, sleek design & reduced weight
- Integrated Accupoint - small, accurate & easy to use

Processor	Screen	MB	Price
486DX4/75	10.4" Dual Scan	330MB	\$1979
486DX4/75	10.4" Dual Scan	500MB	2459
486DX4/75	10.4" Active	500MB	3059



T2130

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- Over 3 Hours of Battery Life
- Ports: 1 16550 High Speed Serial Port, 1 Parallel, 1 Video, 1 Keyboard/Mouse, 1 Docking Station, Audio in/out
- Removable Hard Drive Up to 1 Gigabyte Capacity

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SoundPro P-54 Active Matrix

Intel 75 MHz Pentium® Processor 8MB RAM/340MB HD

- Includes AC Adapter, NiMH Battery, Carrying Case, MS DOS 6.22 & Windows® for Workgroups 3.11 or Windows® 95*
- Options: Docking Station, Internal 14.4/14.4 Fax-Modem, Car Adapter, External Battery Charger, Extra Batteries
- **Sound System Upgrade: \$125.00** Includes External Speakers & Microsoft Sound System Software
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DX4®-75 4MB RAM/340MB HD

- CPU options: Intel DX4®-100 or 75MHz
- Available 10.2" Active Matrix, 10.4" Dual Scan Passive or Monochrome Displays
- 6.3 lbs Color, 5.9 lbs Monochrome
- 4MB RAM
- 1.44MB Floppy
- Local Bus Video & Local Bus HD I/O
- Over 3 Hours of Battery Life
- Removable Hard Drive Up to 1 Gigabyte Capacity

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Or Lease For
\$90/Month*

SoundPro Active Matrix

DX4®-75 4MB RAM/340MB HD

- Includes AC Adapter, NiMH Battery, Carrying Case, MS DOS 6.22 & Windows® for Workgroups 3.11 or Windows® 95*
- Options: Docking Station, Internal 14.4/14.4 Fax-Modem
- **Sound System Upgrade: \$125.00** Includes External Speakers & Microsoft Sound System Software
- **Upgrade to DX4®-100 for \$100.00**

"If you're looking for a fast, affordable computer, look no further."

-Laptop Buyer's Guide and Handbook, 5/95

"No doubt about it, AMS is a tough contender among power mobiles."

-PC World, 3/95

"AMS hits the right price points."

-PC Magazine, 8/95



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Power CD Dual Scan

Intel 75 MHz Pentium® Processor 8MB RAM/520MB HD

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Power CD Active Matrix

Intel 75 MHz Pentium® Processor 8MB RAM/520MB HD

- Internal 5.25" Double Speed CD, Supports CD-ROM and CD Audio
- Choice of Intel 3.3v 75, 90 or 100MHz Pentium® Processors
- 10.4" or 11.3" LCD Available in Dual-Scan Color or Active Matrix Color Displays
- 16-bit Stereo Sound - SoundBlaster™ & SoundBlaster Pro™ Compatible
- Advanced PCI Local Bus Interface
- Built-In TouchPad
- PC Card-1 Type III or 2 Type II Cards
- NTSC/PAL (Direct to TV) Port
- Removable Hard Drive (340MB to 1 Gigabyte)
- 8MB RAM expandable to 40MB
- Built-In SIR Infrared Interface
- Built-In 1.44MB Floppy Drive
- Ports: 1S, 1P, 1VGA, 1 Keyboard, Modem & 2Audio in/out
- 1MB VRAM, Upgradable to 2MB
- Over 3 Hours of Battery Life
- 7.1 lbs. including battery
- Includes Microsoft Windows® 95®, NiMH Battery, & Carrying Case
- Optional Port Replicator or Multimedia Docking Station
- Optional MPEG Module
- Upgrade to the Intel 90MHz Pentium® Processor for \$195.00



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NOTEBOOKS

IBM



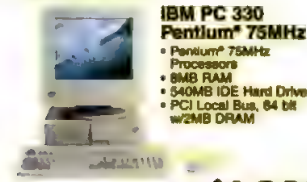
IBM ThinkPad 701C features:

- 10.4" Color Display
- 8MB RAM expandable to 24MB
- Up to 540MB Hard Drive
- 2 Type II or 1 Type III PC Card slots
- TrackPoint™ expandable full size keyboard
- TrackPoint III™ integrated pointing device
- Built-in 14.4/14.4 Dual/Fax Modem
- Wireless infrared port
- Built-in 16-bit audio
- Super NiCad battery
- 3 Year Manufacturer's Warranty

ThinkPad 701CS 486DX/75MHz	360MB, 8MB, 10.4" Dual Scan Color	\$3,149
540MB, 8MB, 10.4" Dual Scan Color		3,449
ThinkPad 701C 486DX/75MHz	360MB, 8MB, 10.4" Active Matrix Color	\$3,699
540MB, 8MB, 10.4" Active Matrix Color		3,999
ThinkPad 755CSE 486DX/100MHz	340MB, 8MB, 10.4" Dual Scan Color	\$3,499
540MB, 8MB, 10.4" Dual Scan Color		3,849
810MB, 8MB, 10.4" Dual Scan Color		4,299
ThinkPad 755C 486DX/100MHz	340MB, 8MB, 10.4" Active Matrix Color	\$4,299
540MB, 8MB, 10.4" Active Matrix Color		4,649
810MB, 8MB, 10.4" Active Matrix Color		5,099
ThinkPad 755CSE 486DX/100MHz	540MB, 8MB, 10.4" Active Matrix Color	\$5,849
810MB, 8MB, 10.4" Active Matrix Color		6,099
ThinkPad 755CV 486DX/100MHz	540MB, 8MB, 10.4" Active Matrix Color	\$6,099
ThinkPad 755CX Pentium® 75MHz	540MB, 8MB, 10.4" Active Matrix Color	\$5,799
810MB, 8MB, 10.4" Active Matrix Color		6,249

SYSTEMS

IBM



IBM PC 330 Pentium® 75MHz

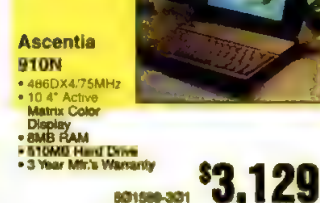
Processor	RAM/HDD	Slots/Bays	Prod. Code	Price
486DX2/66	8/364MB	3x3	IBA657114F	\$1,466
486DX2/66	8/364MB	5x5	IBA658114F	1,553
486DX2/66	8/540MB	5x5	IBA658115F	1,645

IBM Pentium® Models

Processor	RAM/HDD	Slots/Bays	Prod. Code	Price
Pentium® 75MHz	8/540MB	3x3	IBA657635F	\$1,823
Pentium® 75MHz	16/540MB	3x3	IBA657639H	2,166
Pentium® 75MHz	16/850MB	3x3	IBA657637H	2,283
Pentium® 75MHz	8/540MB	5x5	IBA658635F	1,880
Pentium® 75MHz	16/540MB	5x5	IBA658639H	2,225
Pentium® 75MHz	16/850MB	5x5	IBA658637H	2,340
Pentium® 90MHz	8/540MB	3x3	IBA657645F	2,225
Pentium® 90MHz	16/540MB	3x3	IBA657649H	2,570
Pentium® 90MHz	16/850MB	3x3	IBA657647H	2,685
Pentium® 90MHz	8/540MB	5x5	IBA658645F	2,283
Pentium® 90MHz	16/540MB	5x5	IBA658649H	2,628
Pentium® 90MHz	16/850MB	5x5	IBA658647H	2,743

NOTEBOOKS

AST



AST Ascentia 910N 486DX/75MHz

510MB, 8MB, 10.3" Dual Scan Color	\$2,489
510MB, 8MB, 10.3" Active Matrix Color	3,129
720MB, 8MB, 10.3" Dual Scan Color	2,655
720MB, 8MB, 10.4" Active Matrix Color	3,319
AST Ascentia 950N Pentium® 75MHz	
500MB, 8MB, 10.4" Dual Scan Color	\$3,269
800MB, 8MB, 10.4" Dual Scan Color	3,549
1.2GB, 8MB, 10.4" Dual Scan Color	4,015
800MB, 8MB, 10.4" Active Matrix Color	4,669
1.2GB, 8MB, 10.4" Active Matrix Color	5,025

HEWLETT® PACKARD

OmniBook 600C 486DX/50MHz	
170MB, 4MB, 8.5" Dual Scan Color	\$2,369
260MB, 4MB, 8.5" Dual Scan Color	2,505
OmniBook 600C 486DX/75MHz	
170MB, 8MB, 8.5" Dual Scan Color	\$2,819
260MB, 8MB, 8.5" Dual Scan Color	2,999

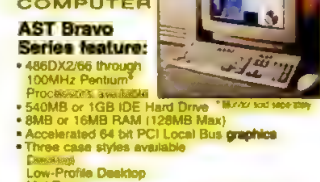
SENS800 Pentium® 75MHz	
520MB, 8MB, 10.4" Dual Scan Color	\$2,799
810MB, 8MB, 10.4" Active Matrix Color	3,299
SENS800 Pentium® 90MHz	
1.3GB, 8MB, 10.4" Active Matrix Color	\$3,799

PC CARDS Megahertz

XJack 14.4/14.4 PC Card Fax/Modem	\$179
XJack Cellular 14.4/14.4 Fax/Modem	199
Gold Series 14.4/14.4 PC Card Fax/Modem	209
Combo 14.4/Ethernet PC Card	379
XJack 28.8/14.4 PC Card Fax/Modem	349

SYSTEMS

AST



AST Bravo Desktop Pentium®

Processor	RAM/HDD	Prod. Code	Price
Bravo MS-T Pentium® 75MHz	540MB IDE Hard Drive	540MB RAM	\$1,634*

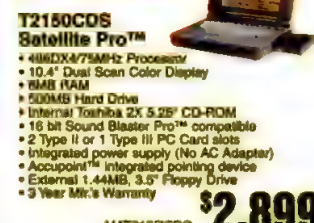
AST Bravo Models

Processor	RAM/HDD	Prod. Code	Price
486DX2/66	8/540MB	501442-401	\$1,354*
486DX4/100	8/540MB	501443-401	1,494*
75MHz Pentium®	8/540MB	501701-401	1,684*
75MHz Pentium®	16/1GB	501701-501	2,264*
90MHz Pentium®	8/540MB	501534-401	1,934*
90MHz Pentium®	16/1GB	501543-501	2,534*
100MHz Pentium®	8/540MB	501754-301	2,104*
100MHz Pentium®	16/1GB	501754-401	2,704*

(Prices listed are suggested. Low-profile and mid tower units are available.)
*After 27% manufacturer's retail-in-rebate—offer ends 8/31/95.

NOTEBOOKS

TOSHIBA



T2150CDS Satellite Pro™

• 486DX/75MHz Processor	
• 10.4" Dual Scan Color Display	
• 8MB RAM	
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• Internal Toshiba 2X 5.25" CD-ROM	
• 16 bit Sound Blaster Pro™ compatible	
• 2 Type II or 1 Type III PC Card slots	
• Integrated power supply (No AC Adapter)	
• Accupoint™ integrated pointing device	
• External 1.44MB, 3.5" Floppy Drive	
• 3 Year Mfr's Warranty	

28.8 PC Card Faxmodem - Just \$219 w/notebook purchase.

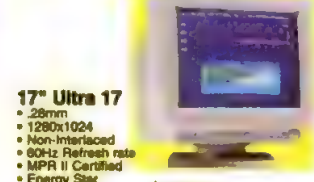
PC CARDS Xircom

Network Combo	\$195
Network RJ-45 or BNC	179

14.4 Fax/Modem PC Card	\$109
14.4 Fax/Modem PC Card w/notebook purchase	99
28.8 Fax/Modem PC Card	239
28.8 Fax/Modem PC Card w/notebook purchase	219

MONITORS

PRINCETON®



17" Ultra 17

14" Ultra 14, 25, 1024x768, N.I. CMPGU14H	\$249
15" Ultra 15, 28, 1280x1024, N.I. CMPGU15	349
17" Ultra 17, 28, 1280x1024, N.I. CMPGU17	629

SONY

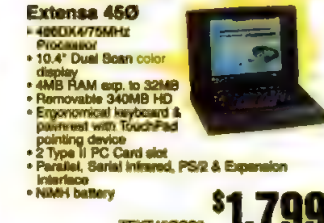
14" 1425, 28, 1024x768, N.I. CM801425	\$309
15" 15SF1, 25, 1280x1024, N.I. CM8E15SF1	449
17" 17SF1, 25, 1280x1024, N.I. CM17SF1	899
20" 20SE1, 30, 1600x1200, N.I. CM20SE1	1,999

ViewSonic

15" 15GA, 27, 1280x1024, N.I. CMVSON15GA	\$559
15" 15GS, 27, 1280x1024, N.I. CMVSON15GS	489
17" 17GA, 27, 1280x1024, N.I. CMVSON17GA	939
17" 17GS, 27, 1280x1024, N.I. CMVSON17GS	849
17" 17PS, 25, 1600x1200, N.I. CMVSON17PS	1,039
20" 20PS, 28, 1600x1200, N.I. CMVSON20PS	1,599
21" 21PS, 25, 1600x1200, N.I. CMVSON21PS	1,969

NOTEBOOKS

TEXAS INSTRUMENTS



Extensa 450

• 486DX/75MHz Processor	
• 10.4" Dual Scan color display	
• 4MB RAM exp. to 32MB	
• Removable 340MB HD	
• Ergonomical keyboard & paired with TouchPad pointing device	
• 2 Type II PC Card slot	
• Parallel, Serial infrared, PS/2 & Expansion interface	
• NiMH battery	

MODEMS Robotics

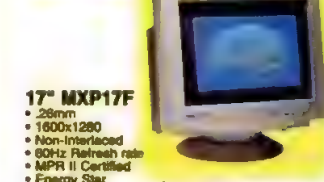
Sportster 14.4/14.4 External MBUSR0278	\$99
Sportster 14.4/14.4 External MBUSR014F	119
Sportster 28.8/14.4 External MBUSRSP4E	199
Sportster 28.8/14.4 External MBUSRSP34E	219
Sportster V1 14.4/14.4 External MBUSRV14H	119
Sportster V1 14.4/14.4 External MBUSRV14E	139
Sportster V1 28.8/14.4 External MBUSRV28E	219
Sportster V1 28.8/14.4 External MBUSRV28E	239

MONITORS

BocaModem 14.4/14.4 External MB8R144H	\$79
Boca Sound Expression 14.4/14.4 Int. MB8RV14H	159
BocaModem 28.8/14.4 External MB8RV28H	169
BocaModem 28.8/14.4 External MB8RV28E	189
Boca Voice View 14.4/14.4 DSVD Int. MB8R144V1H	129

MONITORS

MAC



17" MXP17F

15" DX15FE, 28, 1280x1024, Int. CMXK15FE	\$375
15" MXE15F, 28, 1280x1024, N.I. CMXE15F	489
17" DX17, 28, 1280x1024, N.I. CMXK17	699
17" MXP17F, 28, 1280x1024, N.I. CMXK17F	899
21" MX21F, 28, 1600x1200, N.I. CMXK21F	1,839

CTX

14", 28, 1024x768, N.I. CMCT1461C	\$259
15", 28, 1024x768, N.I. CMCT1565D	389
17", 28, 1280x1024, N.I. CM1765G	679
17", 28, 1280x1024, N.I. CMCT1765G	759

MAGNACOLOR

15" 2015, 28, 1024x768, Int. CMMA2015	\$349
15" 4015, 28, 1280x1024, N.I. CMMA4015	419
17" 4018, 31, 1024x768, N.I. CMMA4018	739
20" 20CM64, 31, 1280x1024, N.I. CMMA20CM64	1,199



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EtherEZ Combo, 16 bit, ISA, RJ-45	\$89
EtherEZ Combo, 16 bit, ISA, BNC & RJ-45	99
EtherEZ Combo, 16 bit, BNC Ethernet Card	89
Elite 16C Ultra Combo, 16 bit, ISA, BNC & RJ-45 Ethernet Card	95
Elite Ultra Combo, 16 bit, ISA, BNC & RJ-45 Ethernet Card 6pk.	559

**Token Ring Adapters Also Available - Call for details!

kingston

2100T+ Ethernet Card, 16 bit, ISA, RJ-45	\$65
2100T+ Ethernet Card, 16 bit, ISA, RJ-45 6pk.	295
2102+ Ethernet Card, 16 bit, ISA, BNC	65
2102+ Ethernet Card, 16 bit, ISA, BNC 6pk.	365
2102H Ethernet Card, 16 bit, ISA, BNC, Hardware Configurable	49
2100TH Ethernet Card, 16 bit, ISA, RJ-45, Hardware Configurable	45

3Com

Etherlink III BNC	\$109
Etherlink III BNC 5pk.	469
Etherlink III Fast Ethernet 10/100, 10 Base T, PCI	225
Etherlink III TP	107
Etherlink III TP 5pk.	439
Etherlink III TP 20pk.	1,579
Etherlink III Combo TP/BNC	121
Etherlink III Combo TP/BNC 5pk.	509
Etherlink III EISA BNC	225
Etherlink III EISA BNC 5pk.	899
Etherlink III EISA TP	225

**Token Ring Adapters Also Available - Call for details!

PRINTERS

hp HEWLETT-PACKARD



Hewlett-Packard DeskJet 850C

- Brilliant full page color printing at up to 2 pages/min.
- Black output at up to 6 pages/min
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- HP's exclusive Resolution Enhancement Technology (RET) for an even sharper output
- 1MB memory maximum 50MB
- Dual VO for either PC or Macintosh connection
- 1 Year Mfr's Warranty

HPDJ850C

\$559

DeskJet	PPM	MEM	DPI	Prod. Code	Price
600	4	512KB	600x600	HPDJ600	299
680C	4	512KB	600x600	HPDJ680C	399
850C	6	1MB	600x600	HPDJ850C	559
1000C	9	4MB	600x600	HPDJ1000C	1,359
1000CM	9	6MB	600x600	HPDJ1000CM	1,979

LaserJet	PPM	MEM	DPI	Prod. Code	Price
4L	4	1MB	300	HPLJ4L	\$519
5L	6	2MB	600	HPLJ5L	879
SMP	6	3MB	600	HPLJ5MP	1,099

MEMORY

PNY

The Memory Leader... Worldwide

16MB Memory Module

- Installation video
- 4 x 32
- 2 pin
- 70ns



Size Speed Pin Product Code Price

2MB	70ns	30	PY1X8-70-2	\$85
2MB	70ns	30	PY1X9-70-2	95
2MB	70ns	72	PY512X32-7	89
2MB	70ns	72	PY512X36-7	105

4MB	70ns	30	PY1X8-2-4	\$169
4MB	70ns	30	PY1X9-3-4	195
4MB	70ns	72	PY1X32-70	169
4MB	70ns	72	PY1X36-70	179

8MB	70ns	30	PY4X8-70-2	\$339
8MB	70ns	30	PY4X9-3-2	319
8MB	70ns	72	PY1X32-7-2	325
8MB	70ns	72	PY1X36-7-2	385
8MB	70ns	72	PY2X32-70	339
8MB	70ns	72	PY2X36-70	375

16MB	70ns	30	PY4X8-70-4	\$649
16MB	70ns	30	PY4X9-70-4	722
16MB	70ns	72	PY2X32-7-2	649
16MB	70ns	72	PY2X36-7-2	749
16MB	70ns	72	PY4X32-70	575
16MB	70ns	72	PY4X36-70	665

32MB	70ns	72	PY4X32-7-2	\$1,145
32MB	70ns	72	PY4X36-7-2	1,325
32MB	70ns	72	PY8X32-70	1,119
32MB	70ns	72	PY8X36-70	1,325

64MB	70ns	72	PY8X32-7-2	\$2,239
64MB	70ns	72	PY8X36-7-2	2,649

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Canon



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- 346 characters per second
- 30 sheets/5 envelope sheet feeder
- 720 dpi
- 20 Truetype scalable fonts
- EPA Energy Star compliant

CNBJC70

\$359

Canon

Bubble Jet	CPS	MEM	DPI	Prod. Code	Price
BJC-610	300	64KB	720	CNBJC610	\$559
BJC-4000	498	64KB	720	CNBJC4000	359
BJC-600E	240	64KB	720	CNBJC600E	479

EPSON

Dot Matrix	CPS	PIN	Prod. Code	Price
LQ-300	240	24	EPSONLQ300	\$189
LQ-570+	225	24	EPSONLQ570+	259
LQ-1070+	225	24	EPSONLQ1070+	409
DFX-5000+	560	9	EPSONDFX5+	1,559
DFX8000	1069	9	EPSONDFX8	2,575

Ink Jet

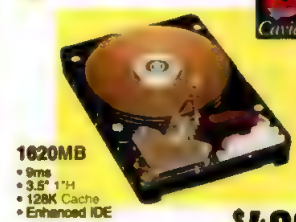
Ink Jet	CPS/PPM	MEM	DPI	Prod. Code	Price
Stylus 800+	250	32K	360	EPSON800+	\$229
Stylus 1000	225	64K	360	EPSON1000	479
Stylus Color	5.5	84K	720	EPSONSTCLR	539

Laser

Laser	PPM	MEM	DPI	Prod. Code	Price
Action Laser 1100	4	1MB	300	EPSON1100	\$399
Action Laser 1400	4	1MB	600	EPSON1400	\$1,539

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WESTERN DIGITAL



1620MB
• 9ms
• 3.5" 1H
• 128K Cache
• Enhanced IDE

WD31600A

\$499

From the Mass Storage Experts.

Capacity** Type Prod. Code Access FF/HZ Price

540MB	IDE	WD2540A	11ms 3.5" 1H	\$185
635MB	IDE	WD2635A	11ms 3.5" 1H	185
850MB	IDE	WD2850A	10ms 3.5" 1H	219
1080MB	IDE	WD31080A	10ms 3.5" 1H	289
1280MB	IDE	WD31280A	10ms 3.5" 1H	299
1620MB	IDE	WD31600A	9ms 3.5" 1H	499

Seagate

420MB	IDE	STB420A	18ms 2.5" 19mm	CALL
524MB	IDE	STB524A	16ms 2.5" 19mm	\$399
810MB	IDE	STB810A	16ms 2.5" 19mm	CALL
545MB	IDE	STB545A	14ms 3.5" 1H	175
854MB	IDE	STB854A	11ms 3.5" 75H	225
1083MB	IDE	STB1083A	12ms 3.5" 1H	259
1080MB	IDE	STB1080A	11ms 3.5" 75H	CALL

Fujitsu

540MB	IDE	FJ1603A	10ms 3.5" 1H	\$189
1080MB	IDE	FJ1606A	10ms 3.5" 1H	259

Quantum

560MB	IDE	SA30560A	12ms 3.5" 1H	\$169
850MB	IDE	SA30850A	11ms 3.5" 1H	215
1000MB	IDE	SA3100A	11ms 3.5" 1H	249
1080MB	IDE	SA31081A	9.5ms 3.5" 1H	315
1272MB	IDE	SA31274A	11ms 3.5" 1H	275
1620MB	IDE	SA31625A	11ms 3.5" 1H	CALL

Quantum

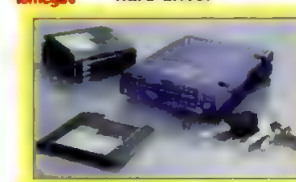
420MB	IDE	QUTR420A	14ms 3.5" 1H	\$159
544MB	IDE	QUFB540A	12ms 3.5" 1H	189
850MB	IDE	QUR850A	14ms 3.5" 1H	235
1080MB	IDE	QUFB1080A	12ms 3.5" 1H	279

**Capacities based upon manufacturer's quoted capacity (1MB=1,048,576 bytes)

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COLORADO

800MB, Travan T-1000 COMPAT1000 \$199

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Seagate



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• 3.5" 1H
• 512K Cache
• Fast SCSI 2
• 7,200 rpm

ST32500A

\$939

From the Mass Storage Experts.

Capacity** Type Prod. Code Access FF/HZ Price

1050MB	SCSI	ST31230N	9ms 3.5" 1H	\$495
2147MB	SCSI	ST32430N	9ms 3.5" 1H	839
4294MB	SCSI	ST15230N	9ms 3.5" 1H	1,079
9090MB	SCSI	ST410800N	11ms 5.25" FH	2,399
2147MB	SCSI	ST32500N	9ms 3.5" 1H	939
4294MB	SCSI	ST15150N	9ms 3.5" 1H	1,449
2134MB	SCSI	ST12450W	9ms 3.5" 1H	1,099
2147MB	SCSI	ST32500W	9ms 3.5" 1H	1,099
4294MB	SCSI	ST15150W	9ms 3.5" 1H	1,525

Fujitsu

540MB	SCSI	FJ1603S	10ms 3.5" 1H	\$195
1080MB	SCSI	FJ1606S	10ms 3.5" 1H	359
2100MB	SCSI	FJ2103S	8.9ms 3.5" 1H	799
4200MB	SCSI	FJ2304S	8.9ms 3.5" 1H	1,099
2100MB	SCSI	FJ2105W	8.9ms 3.5" 1H	879
4200MB	SCSI	FJ2304W	8.9ms 3.5" 1H	1,199

MICROPLUS

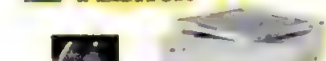
2100MB	SCSI	MC4221AV	8.5ms 3.5" 1H	\$875
2100MB	SCSI	MC3243AV	8.5ms 3.5" 1H	1,248
4300MB	SCSI	MC199AV	12ms 3.5" FH	2,275
4300MB	SCSI	MC4221AVW	8.5ms 3.5" 1H	879
9100MB	SCSI	MC3243AVW	8.5ms 5.25" FH	1,349
9100MB	SCSI	MC199AVW	12ms 5.25" FH	2,375

Quantum

420MB	SCSI	QUTR420S	14ms 3.5" 1H	\$189
540MB	SCSI	QUFB540S	12ms 3.5" 1H	209
850MB	SCSI	QUR850S	14ms 3.5" 1H	279
1080MB	SCSI	QUFB1080S	12ms 3.5" 1H	379
2216MB	SCSI	QUVP3221S	8.5ms 3.5" 1H	799
2510MB	SCSI	QUXP3125S	8ms 3.5" 1H	869
4280MB	SCSI	QUGP4280S	6.5ms 3.5" 1H	1,089

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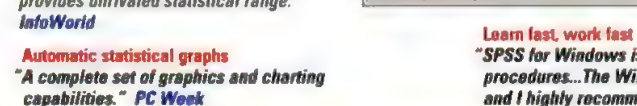
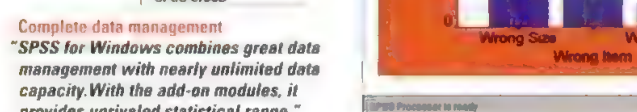
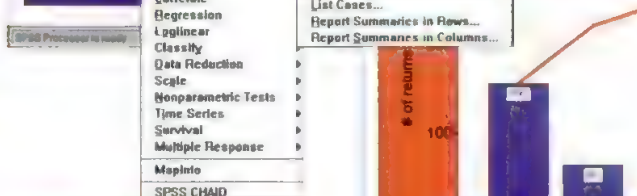
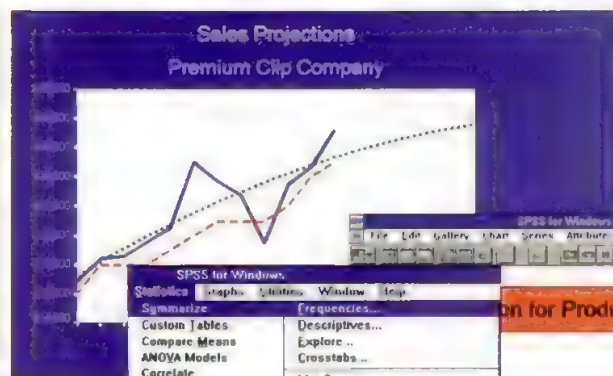
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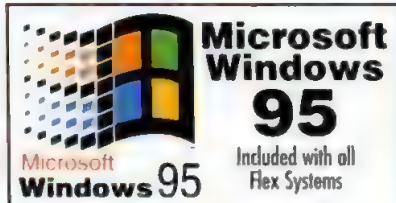
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COMPAQ					
LTE Elite 4/75C Dual Scan	340MB/310MB	\$3674/\$3047	7555C Color Active/CD ROM	540/710MB	\$5649/\$4899
LTE Elite 4/755C Active	340MB/310MB	\$3973/\$4297	7555C Color SVGA/CD ROM	540/710MB	\$5799/\$4649
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NEC					
VERSA V-500 D3X-50 250MB Dual Scan		\$1797	ActiveMedia 650 Mono 250MB		\$1324
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- Perfect Office (Standard) S/W Package
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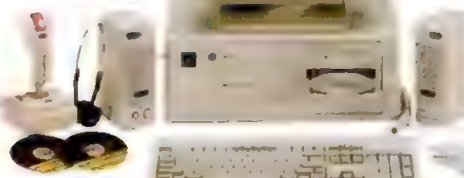


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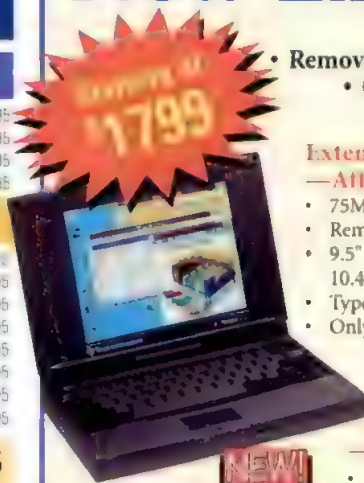
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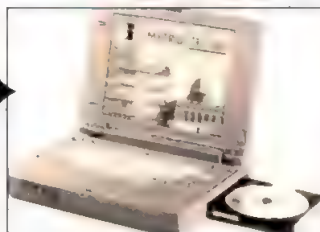
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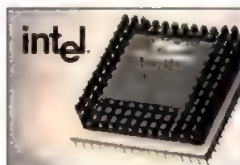
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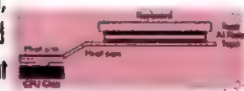
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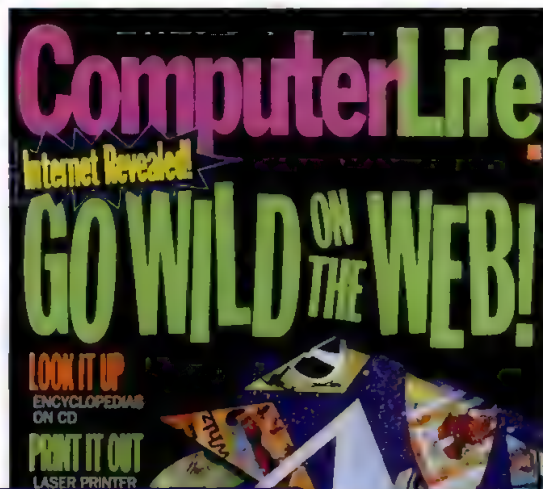
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INDEX

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HARDWARE

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Batteries.....		
Boards/Components/Chips.....	603	616
Communications.....	604,606	
Computer Systems.....	606	617
Input/Data Acquisition/Barcode/POS.....	604	617
Mass Storage Devices.....	608,611	
Multi-Media.....		
Music/Midi.....	611	
Networking.....	612	
Peripherals.....	611	
Power Supplies.....		
Security.....		
Video.....		

SOFTWARE

PREMIER CLASSIFIED

Barcode.....		618
Business Applications.....	612	620
—Single Solution.....		
Business Utilities.....		
CD-ROM Titles.....	614	
Cellular Phones.....		
Communications.....		

Data Entry.....		
Database.....		
Desktop Publishing.....		
Education.....	615	620
Entertainment/Games.....		
Financial/Accounting.....		
Foreign Languages/Font/Translation.....	606	
Graphics/Design/CAD.....		620
—Digital Output Service.....		
Health/Fitness/Nutrition.....		
Human Resource.....		
Mailing List Management.....		
Manufacturing/Inventory.....		
Mapping/Demographic.....		
Medical/Dental.....		
Multi-Media.....	614	
Music/Midi.....		
OS/2.....		
Personal.....		
Programming Tools/Languages.....		
Real Estate.....		
Religion.....		

Scientific/Engineering.....		
Security.....		620
Shareware/Public Domain.....		
Statistical/Research.....		
Utilities.....		
Windows.....		622
Adult.....		625

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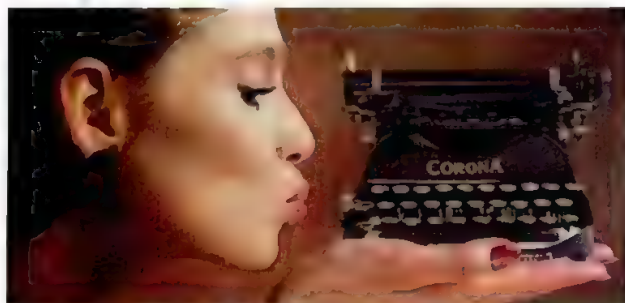
Computer Insurance.....		
Data Conversion/Data Recovery.....		622
Desktop Publishing.....		
On-Line.....	612	623
Scanning Services.....		
Software Duplication.....		623
Training/Tutorial.....		

MISCELLANEOUS

PREMIER CLASSIFIED

Accessories.....		
Books/Catalogs.....		
Business Opportunities.....		
Career Opportunities.....		
Supplies.....	612	623

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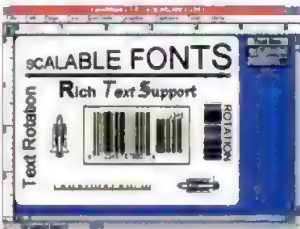
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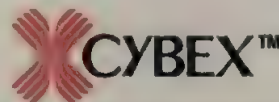
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- 10 ☐ Laser Printers
 - 11 ☐ Ink Jet Printers

- 12 ☐ RAID
 - 13 ☐ DAT
 - 14 ☐ Optical
 - 15 ☐ Storage Devices
 - 16 ☐ PCMCIA products
 - 17 ☐ Tape Back-up
 - 18 ☐ UPS
 - 19 ☐ CD-ROM Drive
 - 20 ☐ Multimedia Kits/Cards
- Software
- 21 ☐ Software Suites
 - 22 ☐ Groupware
 - 23 ☐ Graphics Software
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 - 30 ☐ Remote Access/Node
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 - 32 ☐ Hubs
 - 33 ☐ Network Operating Systems
 - 34 ☐ Network Management
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 - 37 ☐ Network Interface Cards
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1001

Windows 95 Software
1002

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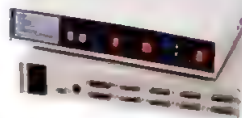


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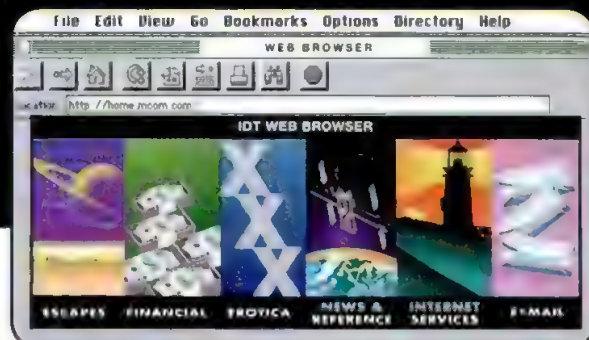
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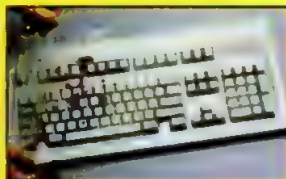
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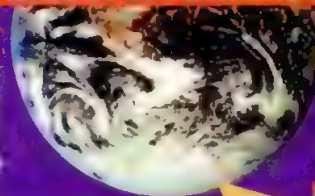
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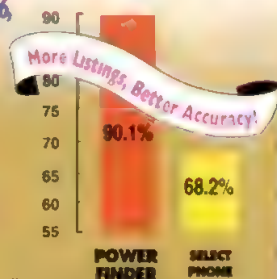
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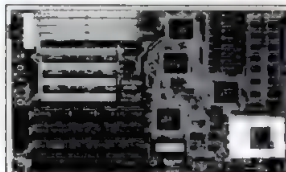
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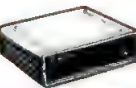
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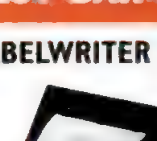




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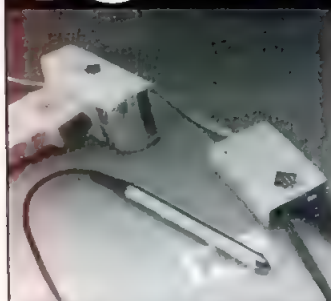
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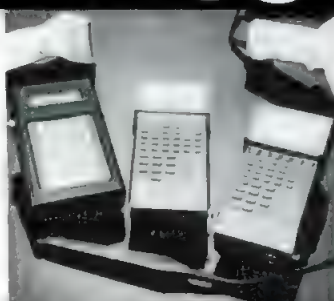
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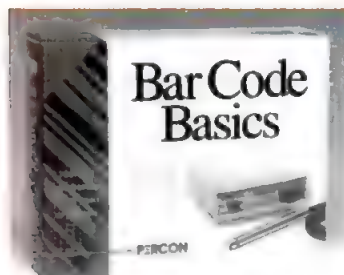
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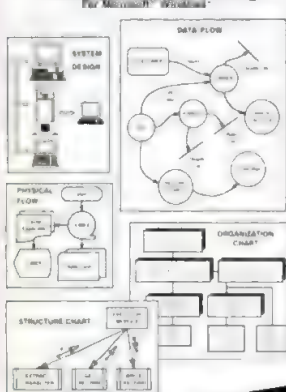
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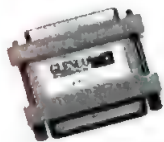
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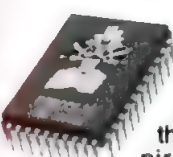
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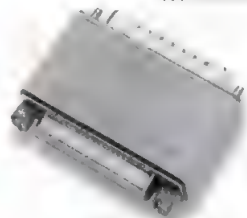
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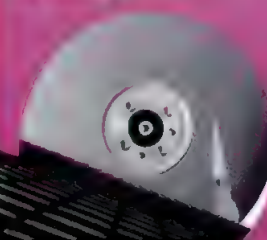
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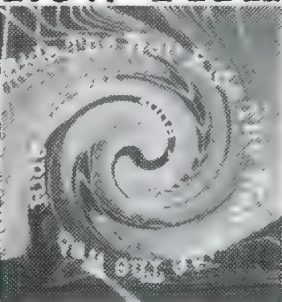
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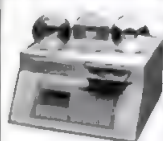
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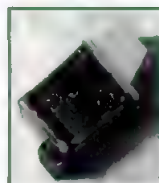
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After Hours

EDITOR'S RATINGS: ★ Poor ★★ Fair ★★★ Good ★★★★ Excellent



You're Never Too Old to Learn

There's no truth to the saying "You can't teach an old dog new tricks." No matter how old you are or how solid your formal education was, there's bound to be a skill you never mastered—and wish you had.

Whether you're interested in learning to speak a foreign language or better understanding a member of the opposite sex speaking your

own language, there's software that can help you achieve your goal. These four programs can help you brush up on your French, learn to communicate more effectively with your spouse, practice your boating skills, and turn your boring home movies into films. The real advantage to using these programs is that you won't have to leave the office early to make it to your class on time.

Hands-On Powerboating

Hearst New Media & Technology, 800-685-3322.

Circle 471 on reader service card

★★★★★ \$49.95

Hands-On Powerboating is as close as you can get to speeding across the Atlantic, without actually leaving the comfort of your den. Based on the authoritative Chapman Piloting, this CD-ROM provides all the instruction that you need to hit the open seas safely in your power boat.

Along with the entire text of *Chapman Piloting*, *Seamanship and Small Boat Handling* and the U.S. Coast Guard's *Rules of The Road* (both of which are indexed and searchable), Hands-On Powerboating includes a series of interactive activities that let you recreate the boating experience. These include a Heavy Seas simulator that lets you practice navigating through dangerous sea conditions, a Docking Simulator that lets you practice docking techniques, an Inlet Running simulator, and a Piloting Exer-

cise that takes you through the complete experience of planning and taking a voyage. Each of the simulations can be customized to match the characteristics of your own boat, so you really get a feel for things. The program also includes a good selection of boating tools, including a float plan and a boater's log as well as checklists and a series of useful calculators.

The simulations are challenging and rewarding, and the text a boon to beginning sailors and old salts

alike. Of course, time at your PC can't compare to actual time on the water. Still, this title comes packed with



Practice docking without getting your feet wet with Hands-On Powerboating.

enough useful information to prepare you more than adequately for life at sea.

Men Are From Mars, Women Are From Venus

HarperCollins Interactive, 800-424-6234.

Circle 472 on reader service card

★★★★★ \$49.95

John Gray, Ph.D., may be the only man in the universe who claims to understand women, and judging by his best-selling book, his sold-out seminars, and his unending success stories, there may actually be some validity to his claim.

For those who've read the book and want more or those who've missed the latest wave in couples therapy, this CD-ROM serves as an interactive version of the best-selling book of the same name. The goal here is the same as in the print version: to provide a universal translator between the Martians and the Venusians so that people can finally understand what their partner really means.

The CD-ROM is divided into four sections: the text of the book, a workshop, discussions of relationships in popular culture, and success stories. In the workshop, you're asked to respond to a dozen questions on how you view your partner. Questions fall along these lines: "Do you feel that your partner blames you for all her unhappiness?" When you're finished with the questionnaire, you head to the video portion of the workshop, which will highlight situations that relate to your answers. Here you'll watch a virtual cou-

AFTER HOURS INDEX	
Adult Education Software	<i>Encyclopedia</i>
<i>Hands-On Powerboating</i>631	<i>Free Willy 2: The Adventure</i>
<i>Men Are From Mars, Women Are From Venus</i>631	<i>Home Interactive</i>
<i>FrenchNow!</i>632	<i>MovieBook</i>
<i>Shoot Video Like A Pro</i>632	<i>Pure Motivation</i>
CD-ROM Pick Hit	<i>Record Producer</i>633
<i>The Beer Hunter</i>632	Strategy
Music	<i>Jagged Alliance</i>634
<i>MusicStar</i>633	Spotlight on Star Trek
Quick Clips	<i>Star Trek: The Next Generation "A Final Unity"</i>634
<i>Bill James Electronic Baseball</i>	

After Hours



Men Are From Mars, Women Are From Venus offers multimedia advice on communication.

ple named Michael and Megan role-play problem situations, such as Michael coming home late without calling. The omniscient John Gray comes to life on the screen to explain what the couple was doing wrong and how to change it; of course, you also get to see a video of the couple demonstrating a better way to communicate. For a more detailed discussion of that type of problem, you can jump directly to the pertinent section of the book.

If you've been trying to figure out what part of the galaxy your spouse came from, this CD-ROM will help translate his or her alien tongue.

FrenchNow!

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Circle 473 on reader service card



If all you remember of high school French is "Bonjour, madame," don't despair. FrenchNow! quickly helps you parlez with the best of them.

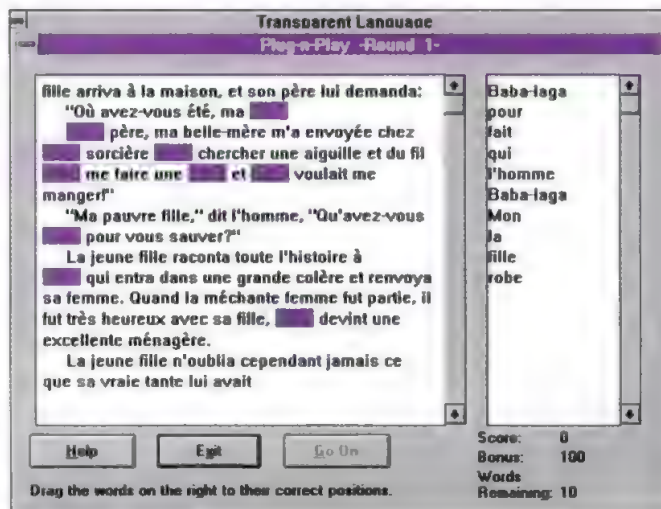
The program attempts to teach French transparently: by immersing you in the language. Instead of starting you off with step-by-step instructions in the basics of grammar and usage, FrenchNow! has you reading original French stories and articles right from the start. As you read, the program provides a paragraph-by-paragraph Eng-

lish translation and information on grammar and word meaning. You can hear native speakers pronounce any words or sentences that have you stumped, then record your own voice to compare pronunciations.

When you're tired of reading, try your hand at one of the games. Plug-n-Play presents you with a passage of text that has ten words blocked out; as you race against the clock, you have to drag the missing words from a list and drop them into the text. In Unscramble, your mission is to reconstruct a mixed-up sentence before time runs out.

Once you master the stories and exercises in this program, you can purchase additional works of literature and nonfiction for your reading pleasure. Other languages are also available in the series.

This total-immersion approach can be demanding and somewhat intimidating for novices. But if you took a year or two of French in college and want to brush up, this is the perfect tutor.



FrenchNow! teaches by immersing you in French stories and texts.

The Beer Hunter

Whether you're an occasional sampler or a full-fledged guzzler, let beer expert Michael Jackson (not Elvis's son-in-law) take you on a trip through the past, present, and future of America's favorite beverage. Start with a multimedia history of brewing to learn how different styles of beer came into existence; as your video pub crawl continues, you'll also learn about the art of brewing commercially and at home. There are detailed profiles of 200 American microbrews, and a list of Jackson's personal favorites. And don't miss the field guide, where Jackson explains the difference between a Pilsner and a porter. If you've got a

CD-ROM PICK HIT



thirst for beer knowledge, then belly up to the bar and let The Beer Hunter be your PC bartender.—John Delaney
The Discovery Channel
Multimedia; 800-762-2189.
Circle 477 on reader service card



Shoot Video Like A Pro

Zelos Digital Learning,
800-345-6777.

Circle 474 on reader service card



Just because you bought a camcorder doesn't mean you're ready to give Steven Spielberg a run for his money. While Shoot Video Like A Pro probably won't get you nominated for Academy Awards, it has a few useful tips to make your home videos more amusing.

The program is divided into four sections concentrating on the main aspects of camcorder creativity: Camera, Compos-



Learn to use your camcorder with **Shoot Video Like A Pro**.

ing, Lighting, and Sound. For example, the Camera module is broken down further into discussing the basics of your camcorder and what focus and zooming are. Along with some text you get a short video demonstration of the concept to show you just what is meant by virtual zoom, along with a tip from a pro.

One of the best features is the opportunity to interact with a virtual camera. This lets you adjust the simulated video shots on your computer screen to match the discussion of moving the shot from left to right or up and down, in order to change the mood. When you're

After Hours

done, a pro explains why your selection failed or succeeded.

Unfortunately, there's just not enough of that sort of information. More depth of discussion, examples, and advice would all be welcomed.

What's here is quite useful, especially for novices, but the program just begs for more.

—Shane Mooney

Music

Instant Music In a Box

MusicStar

Reveal Computer Products,
818-704-6300.

Circle 474 on reader service card

★★★★  \$99

Instant musical gratification is the goal of Reveal's MusicStar, a \$99 package of games,

utilities, and tutorials with its own compact 37-note keyboard. MusicStar has four software modules: two for entertainment and two for education. The educational parts are called Music School and Private Lessons. Music School gives a cursory overview of music theory, a quick overview of music history, profiles of five composers, and a survey of musical instruments. Private Lessons offers a bare-bones approach to playing the piano. Lessons are organized into five levels, but even the highest level coaches only one-hand melodies with no instruction in harmony. That may be a blessing, since the tiny keyboard is tough to play unless you have child-size hands.

The entertainment modules let you create your own music. In the Jam Session module, you dictate the key, tempo, and

QUICK CLIPS

Recommended
Info Your Call
Not Recommended

? Bill James Electronic Baseball Encyclopedia

More data than the average major league manager has at his disposal. Stats on more than 13,000 players make this a must for fanatics, but casual fans will wish there were some pictures to go with the numbers. \$44.95; Miller Associates; 800-654-5472.

Free Willy 2: The Adventure Home Interactive MovieBook

This is a whale of a CD-ROM. Enough games, fun facts, and movie clips to satisfy even the most discerning of Willy watchers. \$24.95; Sound Source Interactive; 800-877-4778.

? Pure Motivation

A stream of inspirational quotes that leaves me more depressed than enlightened. If you need to turn to your PC for daily affirmations, you probably need more than a floppy disk. \$19.95; Insights Software; 310-577-1185.

? Record Producer

Hot technology plus a cool concept equals a lukewarm CD-ROM. If you can't remix the real recording of "Achy Breaky Heart" into a reggae smash, what's the point? \$49.95; Inter-sound Multimedia; 404-664-9262.

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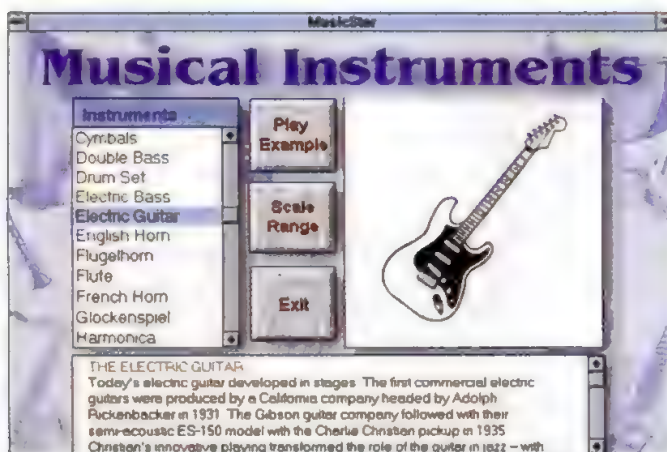


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One of the educational components of MusicStar teaches you about the history, musical range, and uses of a variety of instruments.

harmony, and the program creates a tune. The Recording Session plays back what you've created and allows you to remix or rearrange up to four instrumental parts.

The keyboard may be tough to use, but you won't find a more enjoyable musical plaything at such a reasonable price.—*Bill Dyszel*

Strategy

Mercenaries And Mayhem

Jagged Alliance

Sir-Tech Software, 800-447-1230.

Circle 476 on reader service card

★★★★ \$59

As you begin Jagged Alliance, Lucas Santino, renegade scientist and all-around evil guy, has taken control of Metavira island and its Fallow tree-processing plants. The Fallow tree sap is very rare and the key ingredient in a powerful medicine. Santino's former partners have hired you to take back the island and restore the sap-processing operation. They give you a cash advance and promise more money daily for each Fallow tree you capture.

First, you need to hire a team of mercs. Initially, only a few of the game's 60 will join you. As you gain experience and money, though, that will change. Each merc has a unique personality and salary, ranging from \$35 to \$12,000 per day. One of the game's biggest challenges is simply managing



Hire some mercenaries and embark on a quest to recapture the island of Metavira in Jagged Alliance.

your mercs and keeping them from killing each other. With your team in tow, you can start taking back all 60 sectors of the island by eliminating whatever troops Santino has in place.

The game's overhead view of the action lets you see exactly how each sortie is unfolding. The graphics are very good and

the sound effects and merc voices are excellent; they truly add to the game's atmosphere.

In the end, Jagged Alliance serves up a unique blend of gaming elements that combine to form one of the most enjoyably addictive games to hit the shelves in a long, long time.

—*Michael Ryan*

SPOTLIGHT ON STAR TREK

The Next Generation

The show may be dead, but the crew of the Starship Enterprise is very much alive and well and continuing its mission on Star Trek: The Next Generation "A Final Unity." Playing this game is like having the show on your computer, only now you decide when Picard says, "Engage!"

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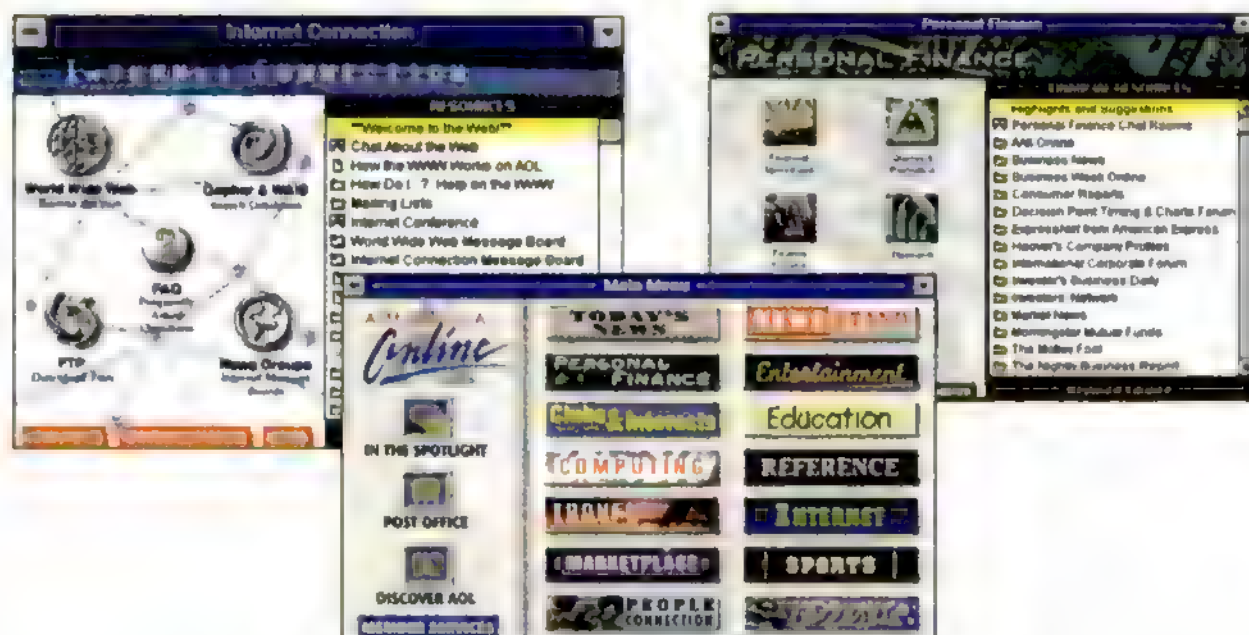
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Reader Service No.	Advertiser	Page
103	3D/Eye Inc.	485 W95
910	3M Data Storage Products	144-145
*	Acer America	77-81
*	Acer America	86-87
034	Acer America	173-178
028	Adaptec	481 W95
226	ADI Systems Inc.	45
030	ADI Systems	519 W95
047	Adobe Systems Inc.	94
252	Adobe Systems	314-315 W95
064	Advanced Logic Research	368-361 W95
*	Advanced Micro Devices	250-251
*	Advanced Micro Devices	332-333 W95
249	AEC Software	469 W95
094	Alaris	529 W95
397	Alpha Software Corporation	517 W95
*	ALPS America	478 W95
*	America Online, Inc.	835-836
*	American Power Conversion	28
057	American Power Conversion	348 W95
049	American Small Business	398 W95
054	AMS	568 W95
235	AMS	588-587
W	APS Technologies	547
MM	Arcada Software	344 W95
119	Arcland	515 W95
336	ARLINGTON COMPUTER PRODUCTS	596
*	ARM Computers Inc.	485 W95
328	Artisoft Inc.	28-27
*	AT&T Multimedia Software Solution	374 W95
*	AT&T	219-224
059	ATI Technologies	451 W95
012	Austin Direct	257-258
215	Austin Direct	475 W95
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016	Ballard Synergy	445 W95
292	Caere Corporation	6
070	California Software	473 W95
074	Caligari	471 W95
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261	Cardinal Technologies	322-323 W95
*	Cirrus Logic	348-347 W95
*	Claris	365 W95
073	Colorado Memory Systems Inc.	382 W95
*	Compaq Computer Corporation	70-71
*	Compaq Computer Corporation	114-115
*	Compaq Computer Corporation	238-231
387	CompuLink Research	292-293
270	CompUSA Direct	554-555
347	Compuserve Internet Division	108
274	CompuServe	551
348	Computer Associates	28-21
082	COMPUTER DISCOUNT WAREHOUSE	338-343 W95
159	COMPUTER DISCOUNT WAREHOUSE	557
360	COMPUTER DISCOUNT WAREHOUSE	558-559
320	COMPUTER DISCOUNT WAREHOUSE	560-561
158	Computer Library	537-539
007	Connectix	78
090	Connectix	352 W95
199	Conner	415 W95
314	Corel Corporation	36
011	Corel Corporation	183
332	Corel Corporation	217
093	Corel Corporation	331 W95
042	Corel Corporation	638
330	Creative Computers	578-579
095	Creative Labs	311 W95
389	Crosstalk/Attachmate	392 W95
008	Crosstalk/Attachmate	418 W95
097	CTX International Inc.	464 W95
286	CTX International	590
331	Cybermedia Inc.	420 W95
108	D-Visions Systems	364 W95
098	Data Products Corporation	492 W95
175	Daytimer Technology	398 W95
*	Dell Computer Corporation	C5-C8
*	Dell Computer Corporation	158
*	Dell Computer Corporation	198-199
*	Dell Computer Corporation	298-299
*	Dell Corporation	395 W95
394	Dell Corporation	413 W95
316	Delrina Technology	18
100	Deneba Software	538 W95
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*	Epson America	18-11
264	Ergo Computing, Inc.	331 W95
354	Ergo Computing, Inc.	598
114	Everex	534-535 W95
133	Farallon	421 W95

Reader Service No.	Advertiser	Page
014	First Source International	575
272	First Source International	578-577
392	Flag Tower Multimedia	633
089	FOSA Computer Inc.	589
111	Frontier Technologies	489 W95
200	FTG Data Systems	4
118	Fujitsu - PC Card Division	525 W95
121	Future Domain	484 W95
123	FWB	457 W95
125	Gainbery Computers	498 W95
*	Gateway 2000	34-35
*	Gateway 2000	121-131
*	Gateway 2000	261-264
*	Gateway 2000	328-329 W95
115	General Parametrics	467
273	Great Plains Software	277
129	Gupta	334-335 W95
182	Hard Drive Super Source	372 W95
062	HARTFORD COMPUTER GROUP	553
263	Hauptpage Computer Works	538 W95
139	Hayes Microcomputer	411 W95
191	Hayes Microcomputer	495 W95
141	Helix Software	463 W95
*	Hewlett Packard	58-59
*	Hewlett Packard	117
*	Hewlett Packard	180-181
*	Hewlett Packard	429 W95
*	Hewlett Packard	455 W95
146	Hyperdesk	486 W95
170	Hyundai	444 W95
*	IBM Corporation	279
*	IBM Corporation	281
*	IBM PC Corporation	41
*	IBM PC Corporation	43
*	IBM PC Corporation	138-139
*	IBM PC Corporation	162-163
*	IBM	72-73
*	IBM	267
160	Improve Technologies	509 W95
340	InContext Systems	202
*	Infomaging	307 W95
278	Insight Direct	588-589
027	Insight Direct	638
*	Intel Corporation	208-209
*	JDR Microdevices	442 W95
144	JVC Information	450 W95
107	Kensington Microware Ltd.	581 W95
165	Keystone Learning Systems	447 W95
106	Kingston Technology	74
371	Kingston Technology	422 W95
019	L.A. Trade	589-591
169	Lansource Technologies	521 W95
096	LOGICODE	391 W95
145	Logitech	377 W95
*	Lotus Development Corporation	87
*	Lotus Development Corporation	212-213
067	MAG Innovation	13
083	Magitronic	549
015	Magnavox	254-255
365	Manugistics, Inc.	22
*	MapInfo Corporate	358 W95
168	Maximus Computer	511 W95
386	Maxtor Corporation	57
178	McAfee Associates	508 W95
018	MegaHaus	558
321	Megahertz Corp.	84
173	Memory Express	354 W95
114	Micro Professionals	402-403 W95
859	Micro Solutions Computer Products	599
184	Micro Xperts	416-417 W95
181	Microcom	386-387 W95
317	Microfield	505
204	Micrografix	363 W95
241	MicroHelp	443 W95
*	Micrologic	491 W95
180	Micron Computer Inc.	308-309 W95
164	Micron Computer, Inc.	155-158
203	Micron Computer, Inc.	564
*	Microsoft	2-3
*	Microsoft	14-15
*	Microsoft	16-17
*	Microsoft	312-313 W95
*	Microsoft	318-317 W95
*	Microsoft	318-319 W95
010	Midwest Computer Works	582-583
398	Midwest Micro	585-588
356	Motorola	228
177	MPC Technology, Inc.	587
058	Mustang Software	493 W95
*	Nanao Corporation	82
327	Navisoft Inc.	68
*	NEC Technologies	2
217	NEC Technologies	C2-C4, p1
275	NETCOM	148
198	Netmanage	337 W95
279	Nikon Inc.	357 W95

Reader Service No.	Advertiser	Page
269	Nikon Inc.	359 W95
143	Nissai Sangyo America	419 W95
*	Nokia	23
*	Nokia	425 W95
344	Northern Telecom	272
*	Novell, Inc.	189-196
126	Nu-Mega Technologies	381 W95
*	Okidata	178
132	Ositech	477 W95
205	Parsons	528 W95
*	PC Connection	594-595
185	PC Importers	503 W95
080	PC Power & Cooling	47
092	PCs Compleat	408-409 W95
268	PCs Compleat	584-585
350	Persoft	483 W95
003	PhoneDisc	468 W95
197	PictureTel	528 W95
002	Pinnacle Micro	324-325 W95
188	Pipline	527 W95
193	Play Inc.	452 W95
131	Portrait Display Labs	481 W95
345	Powersoft Corporation	96
*	Primax	502 W95
161	Princeton Graphics Systems	396-397 W95
056	Pro Direct	563
*	Prodigy Services Co.	247-248
332	Quarterdeck	448 W95
192	Quarterdeck	478 W95
208	Royal	426-427 W95
109	S.A.G./Storage Solutions	488 W95
219	Samsung	234-235
*	Scitor Corporation	55
077	Seagate Technology	436 W95
207	Segue Software	399 W95
248	Simple Technology	92
209	Software Publishing Corp.	433 W95
212	Software Publishing Corp.	465 W95
228	Software Support	518 W95
*	Sony Computer Peripherals	141
071	Sony Computer Peripherals	143
135	Spry	548 W95
043	SPSS, Inc.	581
*	STAC Electronics	63
909	Standard Microsystems Corporation	459 W95
218	STB Systems	522 W95
113	Stylus Innovation	496 W95
335	Sun Microsystems	5
370	Sunshine Computers	366-367 W95
202	Supra Corporation	448 W95
234	Surplus Software	388 W95
242	Swan Technologies	430-431 W95
186	Symantec Corporation	33
374	Symantec Corporation	133
375	Symantec Corporation	135
376	Symantec Corporation	137
282	Tangent Computer	383
214	TOK Corporation of America	478 W95
022	Techmedia	283
230	Techworks	587 W95
001	Tektronix Inc.	240-241
246	Texas Instruments	98-99
304	Texas Instruments	100-101
353	Texas Instruments	102-103
368	Texas Instruments	104-105
280	TGV, Inc.	481 W95
152	Timeslips	518 W95
221	Timex	389 W95
379	Toshiba America	166-167
*	Touche	90
*	Touche	512 W95
236	Touchstone	468 W95
334	Touchstone	497 W95
337	Traveling Software	434 W95
195	Twinhead Corp.	482 W95
*	US Robotics Inc.	52-53
210	USA Flex	592-593
400	Ventana Communications	499 W95
216	Vertisoft Systems	526 W95
243	Viagrafix	541 W95
*	Visio	371 W95
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250	Visual Software	453 W95
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253	Western Digital	487 W95
246	Winbook	518 W95
041	WYSIWYG Corporation	358 W95
078	Xerox Imaging Systems	542-543
*	Zenith Data Systems	244-245
151	Zeos Int'l	24-25
038	Zeos Int'l	88
155	Zeos Int'l	488-1

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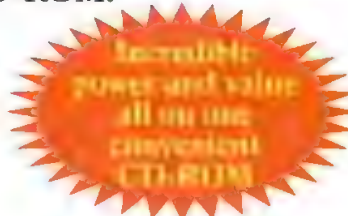
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Reader Service No.	Company	Product	Page	Reader Service No.	Company	Product	Page
ACCELERATOR BOARDS				ELECTRONIC MAIL			
*	Intel Corporation	Overdrive Processor	208-209	347	CompuServe Internet Division	Internet-In-A-Box	108
ACCOUNTING SOFTWARE				*	Lotus Development Corporation	Lotus CC-Mail	67
273	Great Plains Software	Dynamics LAN	277	ENTERTAINMENT SOFTWARE			
BACKUP SOFTWARE				274	CompuServe	On-Line Services	551
859	Micro Solutions Computer Products	Tape Backup	599	392	Flag Tower Multimedia	Entertainment Software	633
CD-ROM				FAX/MODEM			
158	Computer Library	Computer Select	537-539	014	First Source International	Notebooks, Memory, Peripherals	575
272	First Source International	Memory, Software, Notebooks	576-577	272	First Source International	Memory, Software, Notebooks	576-577
278	Insight Direct	CDROM	588-589	321	Megahertz Corp.	XJack PCMCIA V.34 Modems	84
859	Micro Solutions Computer Products	CDROM	599	356	Motorola	Personal Messenger	226
*	STAC Electronics	CD Quick Share	63	FLOWCHARTING			
CHIPS/PROCESSORS				*	Visio	Visio Graphics Software	370
*	Advanced Micro Devices	MicroProcessor	250-251	GRAPHICAL INTERFACE			
272	First Source International	Memory, Software, Notebooks	576-577	034	Acer America	OOBE	173-176
*	Intel Corporation	Overdrive Processor	208-209	275	NETCOM	Personal Internet Services	148
106	Kingston Technology	Overdrive Memory	74	GRAPHICS SOFTWARE			
019	L.A. Trade	Memory	580-581	292	Caere Corporation	OmniPage	6
COMMUNICATIONS SOFTWARE				*	Microsoft	Microsoft Powerpoint	2-3
*	America Online, Inc.	America Online	635-636	*	Visio	Visio Graphics Software	370
347	CompuServe Internet Division	Internet-In-A-Box	108	HARD DRIVES			
316	Delrina Technology	Winfax for Networks	18	052	APS Technologies	SCSI Hard Drives	547
340	InContext Systems	HTML	202	278	Insight Direct	Hard Drives	588-589
327	Navisoft Inc.	Navisoft	68	027	Insight Direct	Hard Drives	630
*	Novell, Inc.	GroupWise End User	189-196	386	Maxtor Corporation	Disk Drives	57
186	Symantec Corporation	pcAnywhere	33	859	Micro Solutions Computer Products	Disk Drives	599
374	Symantec Corporation	Win 95 - NU	133	056	Pro Direct	Mail Order	563
375	Symantec Corporation	Win 95-NAV	135	HARDWARE			
376	Symantec Corporation	Win 95-Navigator	137	*	Advanced Micro Devices	MicroProcessor	250-251
COMPUTERS/COMPATIBLES				*	Canon Computer Systems	Canon IX-4015 Scanners	64-65
*	Acer America	Systems	77-81	387	CompuLink Research	Infinity	292-293
034	Acer America	OOBE	173-176	270	CompUSA Direct	Mail Order	554-555
336	ARLINGTON COMPUTER PRODUCTS	Peripherals/Mail Order	596	007	Connectix	QuickCam for Windows	76
*	AT&T	AT&T Globalyst PC	219-224	330	Creative Computers	Hardware	578-579
012	Austin Direct	Austin Desktops	257-259	286	CTX International	20" Monitors	590
*	Compaq Computer Corporation	Servers	70-71	*	Dell Computer Corporation	Dell Desktop Computers	150
*	Compaq Computer Corporation	Notebooks	114-115	*	Dell Computer Corporation	Dell Notebooks	198-199
*	Compaq Computer Corporation	Desktops	230-231	*	Dell Computer Corporation	Dell Dimensions	298-299
387	CompuLink Research	Infinity	292-293	*	IBM PC Corporation	Server	41
270	CompUSA Direct	Mail Order	554-555	*	IBM PC Corporation	Server	43
159	COMPUTER DISCOUNT WAREHOUSE	Hardware	557	*	IBM PC Corporation	Client/Server	138-139
360	COMPUTER DISCOUNT WAREHOUSE	Hardware	558-559	*	IBM PC Corporation	RS/6000	162-163
320	COMPUTER DISCOUNT WAREHOUSE	Hardware	560-561	*	IBM PC Corporation	Overdrive Processor	208-209
*	Dell Computer Corporation	Dell Desktops	C5-C8	*	Kingston Technology	Kingston Memory	74
*	Dell Computer Corporation	Dell Desktop Computers	150	083	Magitronic	Magitronic	549
*	Dell Computer Corporation	Dell Notebooks	198-199	015	Magnavox	Magnavox Monitors	254-255
*	Dell Computer Corporation	Dell Dimensions	298-299	018	MegaHaus	Drives/Storage	550
354	Ergo Computing, Inc.	CD ROM Notebooks	598	321	Megahertz Corp.	XJack PCMCIA V.34 Modems	84
089	FOSA Computer Inc.	Portables	569	398	Midwest Micro	Desktops/Notebooks/Peripherals	565-568
*	Gateway 2000	PCs	34-35	217	NEC Technologies	Versa	C2-C4, p1
*	Gateway 2000	PCs	121-131	344	Northern Telecom	Nortel Visit	272
*	Gateway 2000	PCs	261-264	056	Pro Direct	Mail Order	563
062	HARTFORD COMPUTER GROUP	Mail Order	553	248	Simple Technology	PC Cards	92
*	Hewlett Packard	HP Vectra PCs	58-59	022	Techmedia	Multimedia Hardware/Boards	283
*	Hewlett Packard	HP NetServers	180-181	INFORMATION MANAGERS			
*	IBM Corporation	Desktops	279	345	Powersoft Corporation	Power Builder Desktop	96
*	IBM PC Corporation	Server	41	INPUT DEVICES			
*	IBM PC Corporation	Server	43	007	Connectix	QuickCam for Windows	76
*	IBM PC Corporation	Client/Server	138-139	*	Epson America	Color Scanner	10-11
*	IBM PC Corporation	RS/6000	162-163	200	FTG Data Systems	Input/Output Devices	4
278	Insight Direct	PCs	588-589	193	Play Inc.	Snappy	452
027	Insight Direct	PCs	630	*	Touche	Touche Touch Pad	90
083	Magitronic	Magitronic	549	LAPTOPS/PORTABLE COMPUTERS			
184	Micron Computer, Inc.	Micron PCs	155-160	*	Acer America	Notebooks	86-87
010	Midwest Computer Works	PCs	582-583	235	AMS	Notebooks	586-587
398	Midwest Micro	Desktops	565-568	*	AT&T	AT&T Globalyst PC	219-224
217	NEC Technologies	Versa	C2-C4, p1	012	Austin Direct	Austin Notebooks	257-259
268	PCs Complete	Mail Order	584-585	*	Compaq Computer Corporation	Notebooks	114-115
210	USA Flex	Desktop PCs	592-593	270	CompUSA Direct	Mail Order	554-555
038	Zeos Int'l	Zeos AMBRA Servers	88	159	COMPUTER DISCOUNT WAREHOUSE	Laptops	557
155	Zeos Int'l	Zeos Pantera Pentium PCs	48a-f	360	COMPUTER DISCOUNT WAREHOUSE	Laptops	558-559
DATA BASE MANAGERS				320	COMPUTER DISCOUNT WAREHOUSE	Laptops	560-561
348	Computer Associates	Open Ingres	20-21	*	Dell Computer Corporation	Dell Notebooks	C5-C8
*	Lotus Development Corporation	Lotus CC-Mail	67	*	Dell Computer Corporation	Dell Notebooks	198-199
DISK BACKUP & TAPE DRIVES				354	Ergo Computing, Inc.	CD ROM Notebooks	598
910	3M Data Storage Products	3M Data Storage Products	144-145	014	First Source International	Notebooks, Memory, Peripherals	575
052	APS Technologies	Tape Backup	547	089	FOSA Computer Inc.	Portables	569
859	Micro Solutions Computer Products	Tape Backup/CDROM/Disk Drives	599	*	Gateway 2000	Notebooks	34-35
DISPLAYS/MONITORS				*	Gateway 2000	Notebooks	121-131
226	ADI Systems Inc.	Monitors	45	*	Gateway 2000	Notebooks	261-264
286	CTX International	20" Monitors	590	062	HARTFORD COMPUTER GROUP	Mail Order	553
067	MAG Innovation	MAG InnoVision Monitors	13	*	IBM Corporation	Thinkpad	281
015	Magnavox	Magnavox Monitors	254-255	083	Magitronic	Magitronic	549
010	Midwest Computer Works	Monitors	582-583	321	Megahertz Corp.	XJack PCMCIA V.34 Modems	84
*	Nano Corporation	Monitors	82	010	Midwest Computer Works	Hardware	582-583
*	Nokia	Monitors	23	398	Midwest Micro	Notebooks	565-568
*	Sony Computer Peripherals	Monitors	141	177	MPC Technology, Inc.	MultiMedia Notebooks	597
071	Sony Computer Peripherals	Monitors	143	217	NEC Technologies	Versa	C2-C4 p1
022	Techmedia	Monitors	283	219	Samsung	Samsung Notebooks	234-235

Advertisers' Index PRODUCTS

Reader Service

No.	Company	Product	Page
246	Texas Instruments	Portables	98-99
304	Texas Instruments	Portables	100-101
353	Texas Instruments	Portables	102-103
368	Texas Instruments	Portables	104-105
379	Toshiba America	Notebook Computers	166-167
210	USA Flex	Notebooks	592-593
*	Zenith Data Systems	Z-Netflex #1	244-245
151	Zeos Int'l	Meridian Color Notebooks	24-25
038	Zeos Int'l	Zeos AMBRA Servers	88

LOCAL AREA NETWORKING

159	COMPUTER DISCOUNT WAREHOUSE	Networking Products	557
360	COMPUTER DISCOUNT WAREHOUSE	Networking Products	558-559
320	COMPUTER DISCOUNT WAREHOUSE	Networking Products	560-561
316	Delrina Technology	Winfax for Networks	18
273	Great Plains Software	Dynamics LAN	277
062	HARTFORD COMPUTER GROUP	Mail Order	553
*	IBM PC Corporation	Server	41
*	IBM PC Corporation	Server	43
*	IBM PC Corporation	Client/Server	138-139
*	IBM PC Corporation	RS/6000	162-163
248	Simple Technology	PC Cards	92
*	STAC Electronics	CD Quick Share	63

MAIL ORDER

*	Acer America	Systems	77-81
*	Acer America	Notebooks	86-87
235	AMS	Notebooks	586-587
052	APS Technologies	Hard Drives/TapeBackup/Storage	547
336	ARLINGTON COMPUTER PRODUCTS	Mail Order	596
*	AT&T	AT&T Globalyst PC	219-224
012	Austin Direct	Austin Desktops and Notebooks	257-259
*	Compaq Computer Corporation	Notebooks	114-115
*	Compaq Computer Corporation	Desktops	230-231
387	CompuLink Research	Infinity	292-293
270	CompUSA Direct	Mail Order	554-555
159	COMPUTER DISCOUNT WAREHOUSE	Resellers	557
360	COMPUTER DISCOUNT WAREHOUSE	Resellers	558-559
320	COMPUTER DISCOUNT WAREHOUSE	Resellers	560-561
272	First Source International	Memory, Software, Notebooks	576-577
089	FOSA Computer Inc.	Portables	569
*	Gateway 2000	Mail Order	34-35
*	Gateway 2000	Mail Order	121-131
*	Gateway 2000	Mail Order	261-264
*	IBM Corporation	Desktops	279
*	IBM Corporation	Thinkpad	281
083	Magitronic	Magitronic	549
010	Midwest Computer Works	Mail Order	582-583
*	PC Connection	Mail Order	594-595
268	PCs Complete	Mail Order	584-585
056	Pro Direct	Mail Order	563
219	Samsung	Samsung Notebooks	234-235
151	Zeos Int'l	Meridian Color Notebooks	24-25
038	Zeos Int'l	Zeos AMBRA Servers	88
155	Zeos Int'l	Zeos Pantera Pentium PCs	48a-1

MASS STORAGE

052	APS Technologies	Storage	547
018	MegaHaus	Drives/Storage	550

MEMORY

014	First Source International	Notebooks, Memory, Peripherals	575
272	First Source International	Memory, Software, Notebooks	576-577
106	Kingston Technology	Kingston Memory	74
019	L.A. Trade	Memory	580-581
203	Micron Computer, Inc.	Micron Memory	564
056	Pro Direct	Mail Order	563

MISCELLANEOUS

274	CompuServe	On-Line Services	551
-----	------------	------------------	-----

MODEMS

321	Megahertz Corp.	XJack PCMCIA V.34 Modems	84
356	Motorola	Personal Messenger	226
056	Pro Direct	Mail Order	563
248	Simple Technology	PC Cards	92
*	US Robotics Inc.	Sportster V.34	52-53

MULTI-MEDIA

007	Connectix	QuickCam for Windows	76
330	Creative Computers	Hardware/Software/Peripherals	578-579
*	Epson America	Color Scanner	10-11
392	Flag Tower Multimedia	Entertainment Software	633
062	HARTFORD COMPUTER GROUP	Mail Order	553
278	Insight Direct	Multimedia	588-589
027	Insight Direct	Multimedia	630
018	MegaHaus	Drives/Storage	550
177	MPC Technology, Inc.	Multimedia Notebooks	597
193	Play Inc.	Snappy	452
248	Simple Technology	PC Cards	92
*	Sony Computer Peripherals	Monitors	141
071	Sony Computer Peripherals	Monitors	143
022	Technimedia	Multimedia Hardware/Boards	283
001	Tektronix Inc.	Tektronix Printers	240-241

MULTIMEDIA SOFTWARE

314	Corel Corporation	Hottest CD ROMS	36
011	Corel Corporation	Blue Tortoise	183
332	Corel Corporation	Arcade Mania	217
042	Corel Corporation	Family of Products	638

Reader Service

No.	Company	Product	Page
392	Flag Tower Multimedia	Entertainment Software	633
340	InContext Systems	HTML	202
*	Microsoft	Microsoft Powerpoint	2-3

NETWORK INTERFACE CARDS

056	Pro Direct	Mail Order	563
-----	------------	------------	-----

NETWORKING SOFTWARE

328	Artisoft Inc.	Power Suite	26-27
273	Great Plains Software	Dynamics LAN	277
*	IBM	OS/2 Warp	72-73
*	IBM	Application Development	267
*	Novell, Inc.	GroupWise End User	189-196
*	STAC Electronics	CD Quick Share	63

OCR PRODUCTS

*	Epson America	Color Scanner	10-11
---	---------------	---------------	-------

ON LINE DATABASE

*	America Online, Inc.	America Online	635-636
274	CompuServe	On-Line Services	551
347	Compuserve Internet Division	Internet-In-A-Box	108
340	InContext Systems	HTML	202
275	NETCOM	Personal Internet Services	148
*	Prodigy Services Co.	Prodigy Online Services	247-248

OPERATING SYSTEMS

328	Artisoft Inc.	Power Suite	26-27
-----	---------------	-------------	-------

OPTICAL PERIPHERALS

018	MegaHaus	Drives/Storage	550
182	Pinnacle Micro	Optical Drives	324-325

ORGANIZATIONAL SOFTWARE

*	Visio	Visio Graphics Software	370
---	-------	-------------------------	-----

ORGANIZATIONS/SERVICES

274	CompuServe	On-Line Services	551
275	NETCOM	Personal Internet Services	148

OS/2 SOFTWARE

*	IBM	OS/2 Warp	72-73
---	-----	-----------	-------

PC ACCESSORIES

859	Micro Solutions Computer Products	Tape Backup/CDROM/Disk Drives	599
-----	-----------------------------------	-------------------------------	-----

PC DIRECT

052	APS Technologies	Hard Drives/TapeBackup/Storage	547
336	ARLINGTON COMPUTER PRODUCTS	Peripherals/Mail Order	596
270	CompUSA Direct	Mail Order	554-555
274	CompuServe	On-Line Services	551
159	COMPUTER DISCOUNT WAREHOUSE	PCs/Laptops/Peripherals	557
360	COMPUTER DISCOUNT WAREHOUSE	PCs/Laptops/Peripherals	558-559
320	COMPUTER DISCOUNT WAREHOUSE	PCs/Laptops/Peripherals	560-561
330	Creative Computers	Hardware/Software/Peripherals	578-579
354	Ergo Computing, Inc.	CD ROM Notebooks	598
014	First Source International	Notebooks, Memory, Peripherals	575
272	First Source International	Memory, Software, Notebooks	576-577
089	FOSA Computer Inc.	Portables	569
062	HARTFORD COMPUTER GROUP	Mail Order	553
278	Insight Direct	Mail Order	588-589
019	L.A. Trade	Memory	580-581
083	Magitronic	Magitronic	549
859	Micro Solutions Computer Products	Tape Backup/CDROM/Disk Drives	599
203	Micron Computer, Inc.	Micron Memory	564
398	Midwest Micro	Desktops/Notebooks/Peripherals	565-568
268	PC Connection	Mail Order	594-595
056	PCs Complete	Mail Order	584-585
043	Pro Direct	Mail Order	563
210	SPSS, Inc.	Statistical/Windows Software	591
	USA Flex	Notebooks/PCs/Printers	592-593

PCMCIA

014	First Source International	Notebooks, Memory, Peripherals	575
321	Megahertz Corp.	XJack PCMCIA V.34 Modems	84
356	Motorola	Personal Messenger	226
248	Simple Technology	PC Cards	92
*	US Robotics Inc.	Sportster V.34	52-53

PERIPHERAL SHARING DEVICE

*	Hewlett Packard	HP Jet Direct	117
---	-----------------	---------------	-----

PERIPHERALS

159	COMPUTER DISCOUNT WAREHOUSE	Peripherals	557
360	COMPUTER DISCOUNT WAREHOUSE	Peripherals	558-559
320	COMPUTER DISCOUNT WAREHOUSE	Peripherals	560-561
007	Connectix	QuickCam for Windows	76
330	Creative Computers	Peripherals	578-579
*	Epson America	Color Scanner	10-11
014	First Source International	Notebooks, Memory, Peripherals	575
*	Gateway 2000	Peripherals	34-35
*	Gateway 2000	Peripherals	121-131
*	Gateway 2000	Peripherals	261-264
278	Insight Direct	Peripherals	588-589
027	Insight Direct	Peripherals	630
015	Magnavox	Magnavox Monitors	254-255
398	Midwest Micro	Peripherals	565-568
356	Motorola	Personal Messenger	226
193	Play Inc.	Snappy	452

Advertisers' Index

PRODUCTS

Reader Service No.

Company

Product

Page

* Touche Touche Touch Pad 90

POWER PROTECTION

* American Power Conversion Back-UPS 28
080 PC Power & Cooling PowerProtection/CoolingDevices 47

PRESENTATION SOFTWARE

* Microsoft Microsoft Powerpoint 2-3
078 Microsoft Microsoft Office 14-15
..... Xerox Imaging Systems OCR Software 542-543

PRINTER ACCESSORIES

210 USA Flex Peripherals/Printers 592-593

PRINTERS

* Okidata OL810e 179
210 USA Flex Peripherals/Printers 592-593

PROGRAM DEVELOPERS

* IBM Application Development 267

PROGRAMMERS TOOLS UTILITIES

348 Computer Associates Open Ingres 20-21
* IBM Application Development 267
345 Powersoft Corporation Power Builder Desktop 96

PROJECT MANAGEMENT

* Sctor Corporation Process Charter 55

REMOTE COMPUTING

356 Motorola Personal Messenger 226
186 Symantec Corporation pcAnywhere 33
374 Symantec Corporation Win 95 - NU 133
375 Symantec Corporation Win 95-NAV 135
376 Symantec Corporation Win 95-Navigator 137
* US Robotics Inc. Sportster V 34 52-53

RENTALS/LEASING

062 HARTFORD COMPUTER GROUP Mail Order 553

RESELLERS

018 MegaHaus Drives/Storage 550
010 Midwest Computer Works Reseller 582-583

SCANNERS

* Canon Computer Systems Canon IX-4015 Scanners 64-65
* Epson America Color Scanner 10-11
193 Play Inc. Snappy 452

SERVERS

* Compaq Computer Corporation Servers 70-71
* Hewlett Packard HP NetServers 180-181
* IBM PC Corporation Server 41
* IBM PC Corporation Server 43
* IBM PC Corporation Client/Server 138-139
* IBM PC Corporation RS/6000 162-163
* STAC Electronics CD Quick Share 63
335 Sun Microsystems Internet Servers 5
038 Zeos Int'l Zeos AMBRA Servers 88

SHAREWARE SOFTWARE

* AT&T AT&T Globalyst PC 219-224

SOFTWARE

047 Adobe Systems Inc PostScript 94
* America Online, Inc America Online 635-636
328 Artisoft Inc Power Suite 26-27
270 CompUSA Direct Mail Order 554-555
274 CompuServe On-Line Services 551
314 Corel Corporation Hottest CD ROMS 36
011 Corel Corporation Blue Tortoise 183
332 Corel Corporation Arcade Mania 217
042 Corel Corporation Family of Products 638
330 Creative Computers Software 578-579
273 Great Plains Software Dynamics LAN 277
* IBM OS/2 Warp 72-73
* IBM Application Development 267
340 InContext Systems HTML 202
027 Insight Direct Software 630
027 Insight Direct Software 630
365 Manugistics, Inc Statgraphics Plus 22
* Microsoft Microsoft Powerpoint 2-3
* Microsoft Microsoft Office 14-15
327 Navisoft Inc Navisoft 68
275 NETCOM Personal Internet Services 148
* Novell, Inc GroupWise End User 189-196
043 SPSS, Inc Statistical Software 591
186 Symantec Corporation pcAnywhere 33
374 Symantec Corporation Win 95 - NU 133
375 Symantec Corporation Win 95-NAV 135
376 Symantec Corporation Win 95-Navigator 137
* Visio Visio Graphics Software 370

SPREADSHEET/TEMPLATES

* Microsoft Microsoft Office 14-15

STATISTICAL SOFTWARE

365 Manugistics, Inc Statgraphics Plus 22
043 SPSS, Inc Statistical Software 591

Reader Service No.

Company

Product

Page

UNIX PRODUCTS

* IBM PC Corporation RS/6000 162-163

WIN 95

103 3D/Eye Inc 3D Software 405
028 Adaptec Airport 2000 481
030 ADI Systems Monitors 519
252 Adobe Systems Photoshop 3.0 314-315
064 Advanced Logic Research Optima SL 360-361
* Advanced Micro Devices AM 486 Microprocessors 332-333
249 AEC Software Fast Track Schedule 469
094 Alaris Matinee 529
397 Alpha Software Corporation OfficeBlox 517
* ALPS America Glidepoint 478
057 American Power Conversion Back-UPS/Smart-UPS 348
049 American Small Business CAD Software 390
054 AMS Notebooks 368
006 Arcada Software Backup Exec 344
119 Arcland FlowModel 515
* ARM Computers Inc Notebooks 485
* AT&T Multimedia Software Solution Designer for Windows 374
059 ATI Technologies Graphics Boards 451
215 Austin Direct Desktops & Notebooks 475
* Autodesk Inc AutoCAD 441
068 Aztech Labs Audio Telephony 2000 435
016 Ballard Synergy d-Time 445
070 California Software InterAp 473
074 Caligari TrueSpace 471
261 Cardinal Technologies Fax/Modems 322-323
* Cirrus Logic Graphics Accelerators 346-347
* Clans FileMaker Pro 365
073 Colorado Memory Systems Inc T1000 Cartridges 382
082 COMPUTER DISCOUNT WAREHOUSE Mail Order 338-343
090 Connectix RAM Doubler for Windows 352
199 Conner Disc-Stor/Tape-Stor 415
093 Corel Corporation Graphics Software 331
095 Creative Labs Sound Card, Modem, Multimedia 311
389 Crosstalk/Attachmate Crosstalk for Windows 392
008 Crosstalk/Attachmate RLN 410
097 CTX International Inc Notebooks 464
331 Cybermedia Inc First Aid 420
108 D-Visions Systems D-Visions OnLINE 364
098 Data Products Corporation Printers 492
175 Daytuner Technology Day-Timer Organizer 2.0 398
* Dell Corporation Dimension 395
394 Dell Corporation Dellware 413
100 Deneba Software Canvas 536
101 Diamond Multimedia Stealth 327
* Digital - MVCS Desktops 533
* Digital Equipment Corporation Desktops 438-439
190 DocuMagix Inc PaperMaster 353
366 Electromedia Productions CD ROM Games 456
110 Envisions Solutions Technology Presto 504
242 EPS Technology Systems 378-379
264 Ergo Computing, Inc PowerBrick 351
114 Everex PCs 534-535
133 Farallon Timbuktu Pro 421
111 Frontier Technologies Super TCP Suite 489
116 Fujitsu - PC Card Division Family of Products 525
121 Future Domain SCSI Adapter/PCI Pentium 404
123 FWB Sledgehammer 457
125 Gainbery Computers HD & Printer Accelerators 498
125 Gainbery Computers HD & Printer Accelerators 498
* Gateway 2000 Systems 328-329
115 General Parametrics Printers 467
129 Gupta SQL 334-335
182 Hard Drive Super Source Hard Drives 372
263 Hauppauge Computer Works Digital Video Software 530
139 Hayes Microcomputer Optima Business Modem 411
191 Hayes Microcomputer Optima 288 PCMCIA Modem 495
141 Helix Software Software 463
* Hewlett Packard HP DeskJet 1600C 429
* Hewlett Packard HP Deskjet 850 455
146 Hyperdesk Software 486
170 Hyundai Monitors 444
160 Improve Technologies Memory Chips 509
* Infomaging 3D Fax 307
* JDR Microdevices CDROM/Software/Upgrade Kits 442
144 JVC Information CDROM 450
107 Kensington Microware Ltd Hardware, Input Device 501
165 Keystone Learning Systems Software Training 447
371 Kingston Technology Processor/Memory 422
069 Lansource Technologies FAXport/WiNport 521
096 LOGICCODE Quicktel 28 & Fax/Modems 391
145 Logitech TrackMan Marble 377
* MapInfo Corporate Mapping Software 358
168 Maximus Computer Systems 511
178 McAfee Associates Virus Scan 508
173 Memory Express Memory 354
114 Micro Professionals Systems 402-403
184 Micro Xperts Computers/Computer Peripherals 416-417
181 Microcom Modems 386-387
317 Microfield Electronic Whiteboard 505
204 Micrografix Graphics Suite 363
241 MicroHelp Uninstaller 443
* Micrologic PIM Software 491
180 Micron Computer Inc PCs 308-309
* Microsoft Microsoft Windows 95 312-313
* Microsoft Microsoft Excel 316-317
* Microsoft Microsoft Word 318-319

**Reader
Service**

No.	Company	Product	Page
058	Mustang Software	BBS Service	493
198	Netmanage	ECCO/Chameleon	337
279	Nikon Inc.	Scantouch	357
269	Nikon Inc.	Coolscan	359
143	Nissel Sangyo America	Hardware	419
"	Nokia	Monitors	425
126	Nu-Mega Technologies	Software	381
132	Ositech	Trumpcard	477
205	Parsons	Greetings	528
185	PC Importers	Peripherals	503
092	PCs Complete	Mail Order	408-409
350	Persoft	Smartterm	483
003	PhoneDisc	PhoneDisc	466
197	PictureTel	Video Conferencing	520
002	Pinnacle Micro	Optical Storage Systems	324-325
188	Pipline	Internet Access	527
131	Portrait Display Labs	Pivot 1700 Monitor	461
"	Primax	Color Mobile Office	502
161	Princeton Graphics Systems	Princeton Graphic Systems	396-397
332	Quarterdeck	CleanSweep	449
192	Quarterdeck	Internet Suite	470
208	Royal	Systems	426-427
109	S.A.G./Storage Solutions	Servers, Storage Solutions	488
077	Seagate Technology	Hard Drives	436
207	Segue Software	Software	399
209	Software Publishing Corp.	Harvard Graphics 4.0	433
212	Software Publishing Corp.	Harvard Chart XL 2.0	465
228	Software Support	Service	518
135	Spy	Internet	540
909	Standard Microsystems Corporation	Ether "power" campaign	459
218	STB Systems	Video Acceleration	522
113	Stylus Innovation	Software	496
370	Sunshine Computers	Notebooks	366-367
202	Supra Corporation	Plug 'n Play	446
234	Surplus Software	Software	388
242	Swan Technologies	Mail Order	430-431
282	Tangent Computer	Servers	383
214	TDK Corporation of America	PC Cards-Global Class Card	479
230	Techworks	Memory	507
280	TGV, Inc.	MultiNet	401
152	Timeslips	Accounting Software	510
221	Timex	DataLink Watch	389
"	Touche	Input Devices	512
236	Touchstone	PC-cillin '95BD	460
334	Touchstone	Win 95 Advisor	497
337	Traveling Software	Communications Software	434
195	Twinhead Corp.	Notebooks	482
400	Ventana Communications	Surf-Watch	499
216	Vertisoft Systems	Solution: Name-IT	526
243	ViaGrafix	Training Software	541
"	Visio	Visio Graphics Software	370
"	Visio	Visio 4.0	371
"	Visio	Visio Technical	373
087	Visiontek, Inc.	Memory Chips Upgrade	487
250	Visual Software	Dallas	453
247	Wall Data	PC To Host Software	472
220	Watcom	SQL Servers	531
251	Western Digital	Paradise	321
253	Western Digital	PCI/SCSI	407
248	Winbook	WinBook XL	516
041	WYSIWYG Corporation	Universal Word	350

WINDOWS SOFTWARE

047	Adobe Systems Inc.	PostScript	94
347	Compuserve Internet Division	Internet-In-A-Box	108
348	Computer Associates	Open Ingres	20-21
314	Corel Corporation	Hottest CD ROMS	36
011	Corel Corporation	Blue Tortoise	183
332	Corel Corporation	Arcade Mania	217
042	Corel Corporation	Family of Products	638
330	Creative Computers	Software	578-579
273	Great Plains Software	Dynamics LAN	277
"	Lotus Development Corporation	Lotus CC-Mail	67
365	Manugistics, Inc.	Statgraphics Plus	22
"	Microsoft	Microsoft Powerpoint	2-3
"	Microsoft	Microsoft Office	14-15
"	Microsoft	Microsoft Word	16-17
"	Novell, Inc.	GroupWise End User	189-196
"	Scitor Corporation	Process Charter	55
043	SPSS, Inc.	Windows Software	591
"	STAC Electronics	CD Quick Share	63
"	Visio	Visio Graphics Software	370

WORK GROUP SOFTWARE

"	Lotus Development Corporation	Word Pro	212-213
"	Novell, Inc.	GroupWise End User	189-196

WORKSTATIONS

"	IBM PC Corporation	RS/6000	162-163
---	--------------------	---------	---------

For Additional Categories see MARKETPLACE PRODUCT INDEX Page 062.



Coming Up

Fixing Problems with Windows 95

Some of the best features in Microsoft Windows 95 are well hidden or downright hard to use. Others simply won't work the way you think they should. Important elements may not even be installed on your computer yet, although you followed Setup to the letter. Whether you're on a standalone PC, a networked desktop computer, or a laptop, you'll find this a useful guide to Windows 95's rough edges and how to smooth them out.

Personal Document and Image Management

Your life is filled with letters, faxes, documents, and filing cabinets. Wouldn't it be helpful to be able to collect all those paper documents—and the electronic ones—into one consolidated, searchable, easy-to-use interface? In theory, that's what the collection of form-fed scanners, personal-document/image management software, and combo packs we review should let you do. In reality...well, you'll just have to read our roundup in the next issue to find out.

PowerPC: Worth the Wait?

PowerPC systems running Microsoft Windows NT are here at last. Is there one in your future? We take a close look at the PowerPC's prospects as an alternative to the Pentium, examining its history and detailing the hardware and software factors that will determine whether the PowerPC can effectively challenge the domination of the x86 processor family. And we test PowerPC machines, including an Apple Power Macintosh, running real applications to see whether the RISC systems deliver on their promise to outperform Pentiums at competitive prices.

Application-Server OSs

Whether you're downsizing business applications from minis or mainframes to PCs or adding a groupware application such as Lotus Notes to your LAN, you'll need a powerful application server with lots of processing power—and the right operating system to run on it. In the past, only RISC-based Unix servers were fast and robust enough for heavy transaction processing, but today's Intel-based servers—with their multiprocessing capabilities, overall fast performance, and increasingly powerful server OSs—are catching up. We test and compare Microsoft Windows NT Server 3.51, Novell's UnixWare 2.01, OS/2 SMP 2.11, and SCO Open-Server Release 5, which are all x86-based and support multitasking, multithreading, and multiprocessing. We also look at Sun-Soft's Solaris for x86 and report on what's in store for NetWare.

Editorial Product Index

Reader Service No.	Product	Company	Page
446	Acadia/VxD 2.0	Ipswitch Inc.	153
462	Accounting Vision/32	Intellisoft Inc.	278
957	Adaptec AllPort infrared adapter kits	Adaptec Inc.	NE32
421	All-in-One Web Surfing & Publishing Kit	The Coriolis Group	66
	AlterDial	UUnet Technologies Inc.	140
	America Online	America Online Inc.	113
413	AnchorPage	Iconovex Corp.	62
972	AnchorPage 1.0 for Windows	Iconovex Corp.	NE6
967	AsantéFast 100 Hub	Asanté Technologies Inc.	NE20
425	AT&T Interchange Online Network	AT&T Corp.	48
	At&T Interchange Online Network	AT&T Corp.	118
471	Borland C++ 4.5	Borland International Inc.	310
412	CardScan Plus	Corex Technologies Corp.	61
970	ChatServer/8E	J&L Information Systems	NE20
422	Clarion for Windows 1.5	TopSpeed Corp.	66
951	Cogent EM110T4 PCI	Cogent Data Technologies	NE31
475	Commerce Builder	The Internet Factory Inc.	233
475	Communications Builder	The Internet Factory Inc.	233
	CompuServe Information Service	CompuServe Inc.	118
417	Cyber Patrol	Microsystems Software Inc.	62
410	CyberSearch for Windows	Frontier Technologies	61
418	CyberSitter for Windows	Solid Oak Software Inc.	62
	Delphi Internet	Delphi Internet Services Corp.	119
463	Dynamics LAN, Version 2.1	Great Plains Software	280
411	Easy Business Cards for Windows	Claris Corp.	61
447	Explore 2.0	FTP Software	161
953	Fast Switch 2800	Grand Junction Networks Inc.	NE31
953	FastSwitch 2100	Grand Junction Networks Inc.	NE31
	GEie Online Services	GE Information Systems Inc.	132
965	GroupStore HSM	Imagery Software Inc.	NE34
441	HoTMetaL PRO 2.0	SoftQuad Inc.	205
956	HotSwap TowerDrives	TAC Systems Inc.	NE32
409	HP OmniBook 600CT	Hewlett-Packard Co.	61
433	HP Pavilion 7050	Hewlett-Packard	46
476	HTTP Server for Windows NT 0.96	EMWAC (European Microsoft)	239
448	IBM Internet Connection for Windows 3.0	IBM Corp.	164
	IBM Internet Connection Service	IBM Global Network	140
464	Impact Encore, Version 1.0	Syspro Impact Software	283
442	InContext Spider 1.0	InContext Systems	207
971	IntellAgent Control System	Veritas Technologies Inc.	NE24
450	InterAp 3.1	California Software Inc.	170
480	Internet AlphaServer 1000	Digital Equipment Corp.	266
451	Internet Anywhere 2.1	MKS Inc.	177
443	Internet Assistant for Microsoft Word for Windows	Microsoft Corp.	211
452	Internet Chameleon 4.5	Netmanage Inc.	178
453	Internet Membership Kit for Windows 2.0	Ventana Communications Group	182
454	Internet Office 4.0	CompuServe Internet Division	186
	internetMCI	MCI Telecommunications Corp.	146
966	ISDN*tek CyberSpace Commuter Card	ISDN*tek Inc.	NE24
966	ISDN*tek CyberSpace Internet Card	ISDN*tek Inc.	NE24
415	Labtec LCS-3210	Labtec Enterprises Inc.	66
969	LANAserver/8E	LAN Access Corp.	NE20
403	LF-1000AB PowerDrive ²	Panasonic Communications & Systems Co.	56
407	Lotus Word Pro 96 Edition for Windows 3.1	Lotus Development Corp.	44
404	Mathcad 6.0	MathSoft	51
420	Matinee	Alaris Corp.	66
431	Medalist 1080	Seagate Technology	54
432	MGA Millennium	Matrox Graphics Inc.	54
487	Microsoft Foundation Classes 3.2	Microsoft Corp.	336
429	Microsoft Office for Windows 95	Microsoft Corp.	38
472	Microsoft Visual C++ 2.2	Microsoft Corp.	322
486	Microsoft Win32 Software Development Kit	Microsoft Corp.	306
426	Microsoft Works 4.0 for Windows 95	Microsoft Corp.	40
430	Milestones, Etc. 4.5	Kidasa Software	42
455	MultiNet for Windows 1.1	TGV Inc.	187
414	Neo Retro Volume 34	Image Club Graphics Inc.	62
	NetCom Internet Services	NetCom On-Line Communication Services	147
484	NetCruiser, Version 1.6	Netcom On-Line Communication Services	164
481	Netra Internet Server	Sun Microsystems Computer Inc.	269
477	Netscape Commerce Server 1.1	Netscape Communications Corp.	242
477	Netscape Communications Server 1.1	Netscape Communications Corp.	242
456	Netscape Navigator, Personal Edition	Netscape Communications Corp.	188
952	NetSuite: Library	NetSuite Development	NE31
952	NetSuite: Professional Design	NetSuite Development	NE31
958	Nov*ix 3.0	Firefox Communications Inc.	NE32
955	Off-SiteServer V.35	Miralink Corp.	NE31
406	OmniPage Pro 6.0	Caere Corp.	50
968	Optiva 8.2.1 Access Server 2.1	Kasten Chase Applied Research	NE19
449	OS/2 Warp Connect, Version 3.0	IBM Personal Software Products	169
485	Pipeline New York Software 2.0.8 for Windows	PSINet, Pipeline Division	164
	Pipeline USA and Interramp	PSI (Performance Systems International)	147
973	PLServer 1.2 for Windows	Personal Library Software	NE6
465	Pro Series 3.01i	SBT Accounting Systems	294
	Prodigy	Prodigy Services Corp.	136
466	Progression Series 7.0, Windows Plus Solutions	Macola Software	288
478	Purveyor 1.0	Process Software Corp.	243
457	Quarterdeck InternetSuite for Windows 1.0	Quarterdeck Corp.	188
408	RealAudio Player 1.0	Progressive Networks	61
959	Remote Laptop Link-PC	KNX Corp.	NE32
964	RISC Router 2800i	Compatible Systems Corp.	NE34
467	Scala for Windows, Version 3.1.5	Scala USA Inc.	300
419	Scrambler for Windows	Scrambler Technologies Inc.	62
428	Sidekick 95	Starfish Software	39
458	Softerm Plus +, Version 4.0	Softronic Inc.	197
468	Solomon IV for Windows	Solomon Software	302
416	SoundWorks Powered Subwoofer	Cambridge SoundWorks Inc.	66
459	SuperTCP Suite 1.1	Frontier Technologies Corp.	200
473	Symantec C++ 7.2	Symantec Corp.	326
427	The Microsoft Network	Microsoft Corp.	42
	The Microsoft Network	Microsoft Corp.	136
461	The Ultimate Desktop Publishing Starter Kit	Addison-Wesley Publishing Co.	69
974	Topic Agents for Windows	Verity Inc.	NE8
974	Topic Developer's Kit	Verity Inc.	NE8
974	Topic Enterprise Server	Verity Inc.	NE8
974	Topic WebSearcher	Verity Inc.	NE8
469	Traverse Accounting Business Software for Windows 2	Open Systems Inc.	303
405	TypeReader Professional 3.0XA	Expervision Inc.	50
954	Vivid Yellow Ridge Ethernet Switch	Newbridge Networks Corp.	NE31
975	WAIS Server 0.3	EMWAC (European Microsoft)	NE10
975	WAIS Toolkit 0.7	EMWAC (European Microsoft)	NE10
474	Watcom C/C++ 10.5	Watcom International Corp.	330
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444	WebAuthor	Quarterdeck Office Systems	218
482	Webforce INDY	Silicon Graphics Inc.	270
470	WebPublisher 1.1	SkiSoft Inc.	216
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460	Windows 95 for Dummies	IDG Books	69
445	WordPerfect Internet Publisher for Windows	Novell Inc.	218
401	World Book Multimedia Encyclopedia 3.1	World Book Educational Products	49
402	ZAP-it	DTS Wireless, Data Transmission Services Inc.	49

NE—Network Edition.

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Abort, Retry, Fail?

THE LIGHTER SIDE OF PERSONAL COMPUTING

By Don Willmott

Not Very Punny

"John Culver Mead was at a University of Arizona computer lab when he tried out a unique form of data entry—he fired several shots at a computer, blasting it to bits. . . . The computer went from on-line to flat line at 3:10 P.M. . . . Police don't know what provoked the 'drive-by shooting' on the information superhighway."

—THE ARIZONA DAILY STAR

One More Thing to Thank Microsoft For

An ad for the \$79.95 BodyCraft Fast-Abs software (800-850-3777) says it's guaranteed to give you sexy, washboard abdominal muscles. How does it work? Details are sketchy, but according to the ad, "The awesome power of Windows allows you to achieve complete muscle definition."



Separated at birth? The cover model from an Egghead Software catalog, left, and downed pilot/all-American hero Scott O'Grady, right.

CAN IT. FAX IT. FILE I

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...and then turns it into a printer. (Fry's Electronics sign.)

Can't imagine why, but faithful reader Roger Lehman is refusing to pay the 6 trillion dollars that Gateway 2000 says he owes the company.

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INVOICE NO: 5796856
INVOICE BALANCE: 6000000000016.70
P.O. #: ORPL-3

RANDOM-NUTTINESS

Here are two of the most bizarre randomly assigned America Online passwords that have crossed our desk recently:

COSMIC-COUSIN
FIBER-FILTHS

If Tripp Lite wants to sell the "Smart Series" of uninterruptible power supplies, it should find a smarter kid.



Richard Tennant

If your entry is used, we'll send you \$50 and a PC Magazine T-shirt. Send your entries to Abort, Retry, Fail?, PC Magazine, One Park Ave., New York, NY 10016-5802. Winners this issue: Everett Eiselen, Larry Harper, Howard Helman, Roger Lehman, David Lepelstat, Jeff Price, Aaron Sargeant, and Christopher Sour.

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Windows® 95

*The VeriTest Cross-Country v2.0 test simulates typical executive use of Microsoft Office® applications in Microsoft Windows® 3.11 during an airplane flight. Power management was enabled and 8MB RAM was installed. VeriTest, inc. is located in Santa Monica, CA. Promotional pricing is not discountable.

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Dell's featured digital artist is Sanjay Kothari of New York, NY.